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COMPENDIUM
CUM
TRAINING MODULE

GENDER MAINSTREAMING IN INTEGRATED WATERSHED MANAGEMENT PROGRAMME

Sponsored by
Odisha Watershed Development Mission
Bhubaneswar-751 003, Odisha

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Editors
Sabita Mishra
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Gender Mainstreaming in Integrated Watershed Management Programme
(Compendium cum Training Module: Capacity building cum skill upgradation programme on 'Gender Mainstreaming in Integrated Watershed Management Programme' organized for Watershed Management Teams at ICAR-CIWA from 9th to 25th February, 2015)

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FOREWORD

Gender equity approach should be very effective in watershed management as it increases men's and women's participation in decision-making processes related to watershed management, promote more equitable access to, control over, and distribution of natural resources among social groups and ensure that watershed management interventions do not adversely affect one social group more than another. This also allows identification of gender roles in the use, supply, administration and conservation of water resources.

A gender perspective on water resource management is important at the household level because women are often the primary users of water for agriculture, livestock as well as health and sanitation. Women's participation is to be facilitated with the understanding of the community in which the watershed programme is to be taken up. Understanding gender roles can be valuable in planning water interventions and policies which are based on the knowledge of how and why people make the choices that they do in the water use in order to meet their needs. Not only do men and women differ in the ways they use and manage the resources, they are also differently affected by degaradtion of resources. The climate change has also to be factored as it still impact the lives of both men and women in a different manner necessitating formulation of gender sensitive coping strategies. In the management of natural resources, deliberate efforts are required on the part of researchers, policy makers, planners and field level functionaries to encourage women actively participate in watershed programmes.

The capacity building programme on 'Gender Mainstreaming in Integrated Watershed Management Programme' being undertaken for Watershed Management Teams (WMTs) at this Institute from 9th to 25th February, 2015 has been planned to strengthen the gender perspective in Watershed Management. I appreciate the efforts of Dr. Sabita Mishra and Dr. Charles Jeeva, Consultants for the programme for bringing out this Compendium-cum-Module, which will be an useful reference material for gender mainstreaming in watresheds.

(NEELAM GREWAL)
DIRECTOR

PREFACE

Women in general are found to have less access to and control over resources, information and development inputs. The strategies for gender equity should be formulated ensuring equal access to project resources for women and men for community, government, and homestead resources.

Women and men are involved in one way or another in watershed management world over. They both play similar, and sometimes different roles and responsibilities in water resource use and management which are closely linked to environmental change and well-being. They are both involved in rainwater harvesting activities, soil and water conservation, and afforestation programmes at domestic as well as at community levels. The role of women in using, managing and protecting the watershed and environment generally is increasing day-by-day in view of the male migration to towns. But, gender analysis has not been a component of most watershed development projects. In this context, it was felt that capacity buidling for the field functionaries of watershed development projects, who are directly involved with different stakeholders and beneficiaries would help them to implement appropriate gender mainstreaming strategies for carrying out technological and social interventions in a befitting manner. Keeping this in view, extensive pre-project diagnostic studies were carried out in randomly selected watersheds to chalk out this compendium-cum-training module. The course contents have been plannned accordingly, and this compendium has been brought out for the benefit of Watershed Management Teams (WMTs) of Odisha Watershed Development Misssion (OWDM).

We are highly indebted to Dr. Neelam Grewal, Director, ICAR-CIWA for necessary guidance and support in organinzing the programme and for bringing out this compendium-cum-training module. Further, we express our sincere gratitude to the Director, OWDM for sponsoring this project on a consultancy mode. Thanks are also due to Mr. Sanjay Kumar Mohanty and Mrs. Kabita Dash of OWDM for facilitating the field studies and for extending necessary coopeartion for organizing the programme. Our thanks are also due to all the in-house and external resource persons, Mr. B. C. Behera, Mr. Subrat Kumar Das, Dr. Binita Behera and the administartive staff of ICAR-CIWA, whithout whose cooperation, this endeavour would not have been a success.

Sabita Mishra
Charles Jeeva

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Agriculture is an engine of growth and poverty reduction worldwide and women are an integral part of it. In India, women's involvement in agriculture is complex and diverse. They participate in wide range of activities in farming. There is a considerable variation in women's participation across regions from north to south, from one socio-cultural group to another and even two production systems. As per census data, share of total women workers in agriculture was 71.8% in 2001 and has come down to about 65% in 2011. However, the multifarious nature of their involvement in farm and households makes it very difficult to assess the exact contribution both in terms of magnitude and nature. At present a reliable and relevant gender disaggregated data is absent.

Significant Participation

In the agricultural sector, women participate in a number of agro-production systems that govern the nature and extent of their involvement. There is a significant heterogeneity across regions, states, locations and context in the role of rural women and their participation in agricultural and other economic activities. Most significant agricultural activities undertaken by women include farming, post harvest management, horticultural crop production, livestock management, fisheries and homestead resources. In paddy, women are mainly involved in transplanting, weeding, harvesting, drying harvest, winnowing and seed storage. As far as total workload is concerned, women spend 40.2 percent of their time per season, performing transplanting (39.1 hours), harvesting (29.8 hours) and weeding (19.0 hours) as the major activities (AICRP Report). In sugarcane based cropping system, women participate in activities like manure and fertilizer application at first step, preparation of sugarcane sets for sowing, placing these sets into the ridges, irrigation, weeding, harvesting, tying the bundles, carrying sugarcane bundles and loading it in to the vehicle. Again these are not women dominant or exclusive activities and are performed jointly with males. The data on role profile indicates that joint participation of rural women with men was higher than independent participation of women in all activity areas.

Gender analysis in various sub activities in livestock management reveals that women play significant role in milk production, processing and marketing of milk products, acting as care providers, feed gatherers, and birth attendants. Women are typically responsible for milking, processing and selling milk products, providing fodder and water, caring for new born calves and sick animals. The data reflects that independent participation of women is highest in homestead garden related activities followed by livestock management. Similar is the case for responsibility profile as activities in these two areas are confined to household vicinity.

A critical analysis of participation of women in different cropping systems has shown that sorghum based cropping system is the only one where participation of women as equal

partners is relatively higher (43%). Though the largest participation of women in percentage terms is observed in paddy (52%) and wheat (40.5%) based systems, they play a subordinate role in both these. Participation of women was the minimum in cotton based cropping system as 58.6% of the activities were exclusive to men.

The rural Indian women and the forests are inter-related and inter-woven. They are the major collectors, processors and users of Non-timber Forest Products (NTFP) than men. Forest is vital for them in providing NTFPs as the main source of livelihood. There are 66.5 million tribals in India and with few exceptions; the majority of them are forest dwellers (FAO, 1997). The women collect fodder, fuel, food, building materials, household materials, Sal and Tendu leaves and farm implements. According to Mishra et. al (2012), the tribal women obtain maximum earnings from fuel wood (60%) and salia leaves (12%). Women also collect medicinal plants as well as possess the traditional knowledge on fodder collection of properties and potential uses of these products. Hence, they are also carriers of indigenous and traditional knowledge.

Women are involved in fish production, drying/curing, marketing, shrimp processing and net-mending in the coastal areas including Maharashtra, Tamil Nadu, Andhra Pradesh and Odisha. In addition, in Andhra Pradesh, women are engaged in mollusk and shell collection on seasonal basis. Among the mangroves of Bhitarkanika on the Odisha coast, both women and men fish in the freshwater.

Gender disaggregated data on various aspects of women in agriculture show that the independent role of women in all the activities has decreased over the years. Apart from the homestead activities that are traditionally considered to be women's domain, their independent role is the highest in livestock production management, followed by post harvest management. The joint participation of men and women is the maximum in fisheries, followed by horticulture and post harvest management. Analysis of the sub activities in this area reflects that women are involved in home based post harvest operations whereas more men were involved not only in field based activities but also activities outside home such as processing, sale, etc. The livestock management performed by women were more laborious and time consuming than the activities performed by men.

Gender Issues in Agriculture

Globally, farmwomen suffer from poor access to various kinds of productive resources and services, most importantly access to inputs, extension and market services, which is an important cause of their low productivity. According to a FAO (2011) study, had they enjoyed the same access to productive resources as men, women could boost yield by 20-30 percent; raising the overall agricultural output in developing countries by two and a half to four per cent. This gain in production could lessen the number of hungry people in the world by 12-17 percent, besides increasing women's income.

The results of gender researches reveal that despite the important role women play in agricultural production, they remain disadvantaged in numerous respects. On one hand, women have limited access to a wide range of agricultural inputs including seeds and fertilizers, technological resources, equipments, land and so forth. In addition, women often lack the capacity needed to deploy these resources. For example, women may have accesss to land but lack the capacity needed to deploy these resources. For example, women may have access to

land but lack of access to the fertilizer needed to farm the land productively or lack of knowledge of how to properly apply fertilizer. Illiteracy, neo-literacy and lack of scientific knowledge are the major impediments in their growth. Furthermore, many non-tangible assets, such as social capital, human capital, rights and decision-making power, are more difficult for women to access.

It has also been observed that most of the agricultural activities undertaken by women are manual and drudgery prone. Trends in farm mechanization also reveal that women are the first ones to be replaced whenever any farm activity gets mechanized. Most of the farm machines-tractors, combines, threshers, balers, transplaters, etc are not gender friendly. Even small tools and implements such as sickles, hoes, clod breakers, etc until recently were made according to male anthropometric measurements. Certain other gender friendly equipments now available include-paddy transplanter, rake, shovel, chaff cutter, fertilizer broadcaster, improved sickle, twin wheel hoe, groundnut decorticator, groundnut stripper, seed treatment drum, bhindi plucker, pedal operated cleaner-cum-grader, maize dehusker cum sheller etc.

Women-friendly Technologies

Poor nutrition is one of the damaging outcomes of gender inequality (FAO. 2005). Women and children are worst affected due to nutritional insecurity. As per 'The State of Food Insecurity in the World 2012', India remains home to the largest number of undernourished people in the world: 217 million (17.5% of its population) as of 2012. However, the status of hunger and malnutrition in India varies according to different sources/ estimates, and goes up to 67% to 77%. Nevertheless, 75% Indians suffer from hunger to varying degrees, nearly 50% of them acutely.

Hunger and malnutrition are, to a large extent, two sides of the same coin. The recent Global Survey Report (2012), released by Save the Children, says that 42% children in India are underweight and 58% are stunted by two years of age. Moreover, under nutrition among women increases reproductive and maternal health risks, and lowers productivity. This situation contributes to women's diminished ability to gain access to other assets later in life and undermines attempts to eliminate gender inequalities. Though the government has tried to address the issue through nutritional supplements and some other indirect measures, sustainable solutions to the problem still elude us. Improving the performance of agricultural sector through gender focused agricultural innovations at micro level would hold the key to overcome the problem of household food and nutritional insecurity.

THE ROAD AHEAD

Efforts for gender mainstreaming are required to bring social, cultural and attitudinal changes which not only strive for ending the invisibility of women's contribution to agriculture, but of eliminating the drudgery that blights the lives of millions of working women in India. It is important to recognize that women's empowerment through technologies can raise their status only through a meaningful stimulation. There is therefore, needed to have the participation of women at every level in decision making, program formulation and implementation.

There is a need to tailor technologies to meet the needs of women agricultural workers- and to make them cheap enough for women to access. It should be ensured that technologies are accessible, income generating, poverty reducing, women friendly and drudgery eliminating,

both for pre and post- harvest operations. The technologies that are reducing drudgery of women must be publicized through the media and as an extension activity. These need to introduce them into the capacity building programs for reducing drudgery and increasing output of women workers.

Agricultural development programs are usually planned by men and aimed at men. Our extension system is male dominated and the extension service given to women is very limited. Expanding the sphere of women extension workers is required who can better identify the women's needs and constraints, priorities and opportunities to meet their requirements. Adequate funds need to be provided to women extension functionaries for field activities and its recognition. For effective extension service, more number of change agents, training programs, infrastructural facilities, allocation of gender budgets, sensitization of extension functionaries, etc. should be made and need based extension models may be developed.

Accumulating evidence show that empowering women is not only important in its own right, but also often highly conducive to improving agricultural productivity, food security, and nutrition. Research and development of agricultural technologies and interventions should begin with an understanding of how men's and women's interests as producers and consumers and work to address the needs of both as equal partners. Only gender mainstreaming in agriculture can lead to productivity gains and improve developmental outcomes for the next generation. Let us all make a concerted effort to improve the might of women in agriculture today for more productive and sustainable agriculture.

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ADDRESSING SOCIAL AND GENDER ISSUES IN WATERSHEDS

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Scenario

The permanent link between living beings and nature is to be sustained and made very strong for benefits of each. Any strain in it would ruin the nature and made the living beings to perish. Based on the above understanding, the watershed approach to development was implemented in India climate almost twenty years back. Growing population puts a lot of pressure on the environment leading to fragile ecologies which make the farming systems unsustainable, risk prone and loss making. Deforestation, soil and water losses, climate change and decline in microbial population have called upon an urgent need for managing natural resources. The detoriation of these natural resources can be checked by well defined management practices leading to overall development of a particular region. Further the Indian agriculture has to address the problems of drought and resource poor farmers and farm women. Large agricultural areas in India are dry land land farms. 60 percent of cultivated area in India is in this category. As a part of our endeavour to strengthen the rural sector, it is important that there be concerted focus on rain fed agricultural to tap its potential. Small and marginal farmers are about 82 percent of the total land owners. The average holding is around 1.5 hectares. Agriculture remains by far the largest employer of our national workforce, providing livelihood to about 60 percent of our people with 65 percent of farm work undertaken by women. The impact of watershed management can be assessed under four dimensions viz; i) physical ii) economic iii) hydrological and iv) social i.e. capacity building.

Social and Gender Issues

The issue in the watersheds cropped up due to interactions between social variables with production, income, income benefit variables. One has to understand and analyze the socio-economic parameters of the watershed and co-relate it with other outputs of the watershed. Data from households can be gathered as population, number of household, workforce, women population, caste composition, occupational structure, land status, livestock, assets, etc through interview schedule. The village questionnaires cover the common property resources, village level saving and investment. The society questionnaire deals with the activities of the society since from inception. Gender analysis may be undertaken to know who does what, when and where with what results and consequences. The Common Property Resources that exist in the area, their management, village communities and their power are also mapped to generate issues to be addressed. A broad social and gender analysis brings out the following issues that affect the impact of the watersheds.

1. Variation among Households on Private Resources

Land owning status, house structure and household assets decide to great extent the attitude and motivation of the people to participate in the watershed. The more is the

diversity the greater will be the difference in motivation. In rural areas, the type of farm decides the say of a household in programme planning and implementation. The success of the watershed depends to a great extent the attitude and motivation of one and all.

2. Cultural Compatibility

Each society has contained well agreed upon norms to celebrate / observe / perform some rituals / activities. The interventions / technologies are judged by the people basing on how is it compatible / desirable? The values and cultural patterns are employed to decide this issue. Generally, programmes / innovation antagonizing the societal norms are seldom accepted and sustained. Perceptions of the people are an important component of culture that may oppose or favor the project.

3. Conflict of Demands and Interests

The rural communities have many social groups created on common interest who often do not accept proposals that go against their interest. Contradiction within a system may leads to conflicts among farmers. Without identifying links between various groups, joint determination of the use of and access to, resources is not sustainable.

4. Co-operation of People

There is a general complain in the watersheds that people do not understand the importants and do not co-operate with the programme. Wherever a resource (land / water / forest) to be managed has some of the characteristics of a public good, co-operation of the people is a vital and necessary component. Some kind of adjustment and accommodation in social decision making system are required to accommodate conflicting demands.

5. Technological Appropriability

It refers to how for agricultural technology, be it seed, fertilizer or improved machinery suits the social and infrastructural situation of the end users. It should also ensure efficiency over the current practice being followed by the farmers.

6. Traditional / Social norms in Management of Common Property Resources

The amount of resources varies across states but agriculturally less progressive state are found having more resources (water, land, forest) which provides income in terms of (irrigation, fodder, fuel and grass). Social norms in managing resources and distribution of benefits go a long way for the success and absence of this would hamper the implementation in developing a conducive social environment.

7. Recognition to Women Folk

Women in rural areas perform triple role i.e. production, reproductive and community wel fare but remain invisible in the family, community and society. They work hard in farm sectors namely crop production, vegetable farming, livestock, pisciculture, post harvest and value addition and market. They also perform household chores and render services for welfare of community. The cultural sanction given to women is deplorable for which they remain stagnant and de-motivated. With due recognition to their contribution they will rise and play a vital role in the watershed programmes.

8. Participation

The issue of participation especially the gender participation is crucial for the success of the watershed. Participation of households belonging to the lower strata remains in question. Similarly, women do not get opportunity to plan, implement, monitor and evaluate the program, even through they have knowledge, experience and capacity to perform. At household level, they do not enjoy freedom to decide and their access to and control over productive resources is very limited. They fail to show their talents because of their sub-ordinate position in the society. Gender equality in opportunity is right way to bring women to main stay of development. Even women's mobility especially journey to distance places to participate in trainings, undertake jobs etc is limited.

9. Sharing of Benefits

Each individual of the social system should get benefit from the watershed otherwise it would not be sustainable. Owning the programme, a positive behavior emanates from benefit sharing. Landless farmers and poorest of the poor should not be left out of the programme and must get benefit in accordance to their contribution. Usually, women support different productive activities in the home and community but they are paid less than men. Gender equity is an important issue to be looked upon while implementing the program. It is not only the monetary benefit but other social benefits like nutrition, employment, fuel, fodder and leadership should be kept in view while compensating their contribution.

10. Differences between Common Property Resources (CPRs) and Private Property Resources (PPRs)

Participation as a process can be promoted if there is increasing adherence to a set of rules. It is furthered if there is equal access to CPRs and a high level of development at the village level. Linking the CPRs and PPRs is very much wanted in order to define how different social homogenous group would equal access to CPRs. Grouping of households, taking into account the links between CPRs and PPRs and levels of benefits derived is complex problems both statistically and interpretationally.

Approaches to Address the Issues

The social and gender issues as discussed earlier mostly originate from the inequalities of class, caste and gender. Participation has to be considered for the desired changes which may include the following points.

1. Clear cut Objectives and Methodology of Watershed

The project objectives and its operational processes should be well written which should be discussed by various groups. Local suggestions may find place before it is ready for implementation.

2. Gender Sensitization

This is a process by which people understand and recognize the role played by women in the society. The people may further act to create opportunities for them and support women to solve their problems and meet their needs. This may be done through training, meeting and workshop. It is not meant to divide the society but to integrate gender roles.

3. Ensuring Participation

Participation of people in the watershed programme is very crucial for the success. The participation may take place in many level and many forms. Being voluntary in nature the methodology should be worked out keeping in view the development and behavioral considerations. The following general guidelines may help the project personnel to promote participation in the programs.

- Identify different social groups in the project area and understand their problems, needs, asserts, interest, strength, etc.
- Linking the CPRs with PPRs for sustainability and productive use of resources created under the project.
- Appropriate cost effective farm technologies are liked by the farmers, which result in the wider adoption of technology and create impact on productively, production and employment. Women friendly technology / implement may help the farm women to reduce drudgery and increase their work efficiency.
- Poor, small and marginal farmers' needs and problems are very important as they form the majority and the fruit of development must reach them on priority. The constraints faced by them while taking part in the programme should be solved.
- User groups may be formed to use the resources developed under the projects and help other groups directly or indirectly to grow. The user groups must function not only to harness benefits but also to conserve the returns for maintenance of community asserts.
- The participation of people in the programme must be in all stages of the project starting from planning up to evaluation. The decision making should be collective one but not due to individual's influence.
- When use of resources like water, forest, fodder, fuel wood is concerned, women must take active role in decision making. Because they have knowledge and interest to manage the resources.
- Contribution of women to community, group and home is often not recognized for which they don't get direct benefits from their work. Women should participate in the project as per their capacity and should get equitable benefits.

4. Training and Workshop

Training and Workshop are very much required to develop capacity of the people on different aspects of agriculture and allied sectors. Training on livestock, vegetable, mushroom, post harvest and value addition are useful for farm women. Workshop of village level may help the project to sot out differences and conflicts between groups and execute the programmes with needed co-operation.

5. Strong adherence to some philosophy, traditional values, positive egos, may yield good results in term of securing participation. Those values may be natured with added operational guidelines to meet objectives. This motivates people to work together with determination.

6. **The social climate**, while recognizing women's role in society, should ensure access of women to productive resources of the family and community. Gender bias in the project may kill the true spirit of participation and would not be helpful to generate better life and income for the women. Village level institutions should support the program and start dialogue with stakeholders to build a gender sensitive climate for improving women's participation in the project. The support / expertise of these institutions should also be taken in different steps of program implementation.
7. **Marketing** of the produces and products may form an important component of the project. This would boost up production and improve the sustainability.
8. **Selection of leaders** for different groups should be made carefully so that facilitative and enabling type of leaders should get chance to operate. A good inter-personal relationship and permissive climate can be maintained by the leaders which would lead to group cohesiveness.
9. **Motivating youth** to participate in the project and taking up challenging jobs like marketing, infrastructure development etc may be very fruitful.
10. **Integration of income sources** of Community Property Resources (CPRs) and Private Property Sources (PPSs) is most desirable for proper utilization and conservation of resources created under watershed. This would create a profound impact on land use, cropping pattern, crop production, income and employment.

Conclusion

Social and gender issues must be addressed to minimize inequalities in many spheres of social livings. Watershed project personnel must understand the inequalities, participation methodologies and integrative approaches and develop cohesive user groups as prerequisites for sustainable watershed programmes.

GENDER ANALYSIS TOOLS FOR MICRO LEVEL PLANNING

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The present issue of global concern is gender equality and women empowerment. Now, the researchers and policy makers have realized the importance of gender equality. Therefore, to bring equal status, gender analysis is a must to understand the gender issues, their roles, responsibilities, needs, etc. A number of tools/frameworks are available for gender analysis as following.

Gender Analysis Tools/Frameworks

1. Harvard Analytical Framework
2. Moser (triple roles) Framework
3. Levy (web of institutionalization) Framework
4. Gender Analysis Matrix (GAM)
5. Equality and Empowerment Framework (Longwe)
6. Capacities and Vulnerabilities Framework (CVA)
7. People Oriented Framework (POP)
8. Social Relations Framework (SRF)
9. SEAGA Approach of FAO

SEAGA tools: SEAGA is a technique for gender analysis which has been developed by FAO. SEAGA is an approach stands for socio-economic and gender analysis and helps in participatory identification of priorities of women and men to bridge the gap between them. It helps the participants to better understand the ground realities of the women and men, to identify the gender issues with respect to activities, access to and control over resources, decision making, needs and problems and also to formulate projects for gender mainstreaming in research and extension. On the other hand, it is for analysis of the current situation and planning for the future.

Broadly, all the tools are classified into three categories of gender analysis as:

a) **Development context toolkit:** Here, the focus remains on current situation (What is) for learning economic, environment, social and institutional patterns that act as supports or constraints for development.

b) **Livelihood analysis:** Here, the focus is on current situation (What is) for learning the flow of activities and resources for living.

c) **Stakeholders' priorities**: Here, the focus is on future (What should be) for planning development activities based on women's and men's priorities.

A. Tools under Development Context:

(i) Village Resources Maps
(ii) Transects

(iii) Village social map
(iv) Trend lines
(v) Venn Diagrams
(vi) Institutional profiles

(i) Village Resources Map: Helps for learning about the environmental, economic and social resources in the community. This map focuses on available resources like roads, buildings, houses, water bodies, agriculture land, grazing land, forest area, shops, health clinics, educational institutions, religious institutions, bus stop, etc.

(ii) Transects: It gives more details about environmental, social and economic resources in a community and provides a cross sectional picture of an area through direct observation. Helps for learning about the community's natural resource base, land forms, and land use, location and size of farms or homesteads, and location and availability of infrastructure and services and economic activities.

(iii) Village Social Map: It gives a perceptional picture of resources existing in the community. It helps for learning about the community's population, local poverty indicators and number and location of households by type (ethnicity caste, female-headed, wealthy, poor, etc.).

(iv) Trend lines: It is a simple graph depicting change over time. It gives a picture of what is getting better and what is getting worse over time. It helps for learning about environmental trends (deforestation, water supply); economic trends (jobs, wages, costs of living), population trends (birthrates, out-migration, in-migration), and other trends of importance to the community.

(v) Venn Diagrams: Through this tool we can identify the potential conflicts between different socio-economic groups. It helps for learning about local groups and institutions and their linkages with outside organizations and agencies.

(vi) Institutional Profiles: It helps for learning about the goals, achievements and needs of local groups and institutions.

B. Tools under Livelihood Analysis:

(i) Farming system diagram
(ii) Benefits analysis flow chart
(iii) Daily activity clocks
(iv) Seasonal calendars
(v) Resource picture cards
(vi) Income and expenditure matrices

(i) Farming Systems Diagram: It is a diagram to highlight the farming systems in family. It helps for learning about household members' on-farm (crop production), off-farm (fuel collection) and non-farm (marketing) activities and flow of resources to and from the home. It shows how livelihood depends upon various types of agro-eco-systems like forest, river, grazing land, etc which are in common use.

(ii) Benefits Analysis Flow Chart: Through this analysis, we may be able to understand what the 'fruits' are from people's livelihood activities and who enjoys that. It also helps for learning about benefits use and distribution by gender. The bi-products are the result

of any resource. Example, 'tree' as resource has bi-products like leaves, bark, fruits, seeds, fiber, fuel wood, fodder, etc, Here, who is the gender to enjoy these can be understood.

(iii) **Daily Activity Clocks:** It gives a total picture of activities performed by gender in a day and who does more and also who does less. Helps for learning about the division of labour and labour intensity by gender and socio-economic groups. It helps to identify the workloads and leisure time for the community people including men, women, rich, poor, young and old. The clear picture comes that who works for longest hours and who does little activities.

(iv) **Seasonal Calendars:** Helps for learning about the seasonality of women's and men's labour and seasonality of food and water availability and income and expenditure patterns and other seasonal issues important for the community. The calendars can be used to know the changes in income over the time and the work opportunity for the people at different periods of time.

(v) **Resources Picture Cards:** Helps to know the gender based resource use and control within the household. This exercise facilitates us to know who is likely to be looser and who is likely to be gainer because of a particular development activity. It gives idea about who has access over the household resources (land, livestock, trees) and who takes decisions for its use.

(vi) **Income and Expenditures Matrices:** Helps to find out about sources of income, sources of expenditures and changes in expenditure at crisis. Analyzing their items of expenditure the priorities and limitations can be understood. It helps to understand the security or vulnerability of livelihood, meeting basic needs and saving if possible for rainy days.

C. Tools under Stakeholders' priorities:

(i) Pair wise Ranking Matrix
(ii) Flow Diagram
(iii) Problem Analysis Chart
(iv) Preliminary Community Action Plan
(v) Venn diagram of Stakeholders
(vi) Stakeholders Conflict & Partnership Matrix
(vii) Best Bets Action Plans

(i) **Pair wise Ranking Matrix:** Helps to know the most important problems in the community, the priority problems of women and men and of different socio-economic groups.

(ii) **Flow Diagram:** This analysis helps to identify about the causes and effects of their problems and can be used for possible solutions. This identifies the major problem in the community and decides which problem to be solved by the community, which can be solved by the external source and which has no solution like natural disasters.

(iii) **Problem Analysis Chart:** It is used for bringing together the priority problems of all the different groups in the community, to explore local coping strategies and to identify opportunities to address the problems.

(iv) **Preliminary Community Action Plan:** It is helpful for planning possible development activities, including resources needed insider and outsider groups to be involved and timing.

(v) **Venn diagram of Stakeholders:** Stakeholder is anyone who has interest in and is going to be affected in any developmental work. It helps us to know who is going to be affected by the proposed development plan. Gives a picture about the insider and outsider stakeholders for each action proposed in the Preliminary Community Action Plan. The extent of interest of a stakeholders is determined by the size of their stake in it.

(vi) **Stakeholders Conflict and Partnership Matrix:** This analysis helps for learning about conflicts of interests and common interests between stakeholders.

(vii) **Best Bets Action Plans:** Facilitates for finalization of action plans for development activities meeting priority needs as identified by women and men of each socio-economic group

Based on their communities, priorities and needs these tools for gender analysis can be used by the researchers with little modification

TECHNIQUES / TOOLS FOR FIELD

TREND LINES

A group of older men and women should be involved in discussion as they know more about the past events. Ask them about important changes in the community (may be better or worse) related to natural resources, populations and economic opportunities.

Sl. No	Years	Events	Intensity of events
1.	1980		
2.	1985		
3.	1990		
4.	1995		
5.	2000		
6	2005		
7.	2010		

DAILY ACTIVITY CLOCKS

Time	Women	Men
0 to 1 am		
1 to 2 am		
2 to 3 am		
3 to 4 a		
4 to 5 am		
5 to 6 am		
6 to 7 am		
7 to 8 am		
8 to 9 am		

9 to 10 am		
10 to 11 am		
11 to 12 am		
12 to 1 pm		
1 to 2 pm		
2 to 3 pm		
3 to 4 pm		
4 to 5 pm		
5 to 6 pm		
6 to 7 pm		
7 to 8 pm		
8 to 9 pm		
9 to10 pm		
10 to 11 pm		
11 to 12 pm		

ANALYSIS OF ACCESS AND CONTROL OF RESOURCES

Sl. No	Resource	Access			Control		
		Male alone	Female alone	Joint	Male alone	Female alone	Joint
1.	Land						
	(i) Family land						
	(ii) Lease land						
2.	Capital						
	(i) Family income						
	(ii) Credit from bank						
3.	Water						
4	Seeds/seeding materials						
5	Labour (manual)						
6.	Manures and fertilizers etc.						
7.	Machines/equipments						
8.	Farm produce						
9.	Food						
10.	Technology						
11.	Trainings						
12.	Extension services						
13.	Market information						
14.	Farm profit						
15.	Co-operatives societies						

PAIR WISE RANKING MATRIX

Organize two separate focus groups: one of women one of men with a mix of socio-economic groups. Ask the participants to list 6 problems important to them. Write the list of 6 problems on both the vertical & horizontal axis of the paper. Also write the problem in separate six cards, show the participants a pair of problem cards asking them the more important .One with reasons of choice. Record their choice on the prepared matrix.

Example

Problems	Cost of Inputs	Insect pest	Technical knowledge	Climate	Irrigation	Land
Cost of Inputs		Cost of Inputs	Cost of inputs	Cost of inputs	Irrigation	Cost of inputs
Insect pest			Insect pest	Climate	Irrigation	Insect pest
Technical knowledge				Climate	Irrigation	Technical knowledge
Climate					Irrigation	Climate
Irrigation						Irrigation
Land						

Problems	Number of Times Preferred	Rank
Cost of inputs	4	2
Insect Pests	2	4
Technical knowledge	1	5
Climate	3	3
Irrigation	5	1
Land	0	6

PROBLEM ANALYSIS CHART

Problems	Causes	Coping strategies	Opportunities

SOURCE: *FAO SEAGA FIELD TOOL KIT. GENDER ANALYSIS FOR SUSTAINABLE LIVELIHOODS*

GENDER DISAGGREGATED DATA AND ITS IMPLICATIONS FOR GENDER MAINSTREAMING

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Gender-disaggregated data means every data that is cross-classified by gender, presenting information separately for women and men, boys and girls. Gender-disaggregated data reflect roles, real situations, general conditions of women and men in every aspects of the society. For instance, the literacy rate, education levels, business ownership, employment, wage differences, dependants, house and land ownership, loans and credit, and debts are all included. Without gender-disaggregated data, it will be more difficult for us to identify the real and potential contributions of half of the population to our country, and could hinder the development of effective policies. Statistical analytical procedures remain same for analysis of gender disaggregated data. The only important part is to consider gender as one component which must be incorporated in the whole procedure during analysis and such analysis helps not only to know the current status of involvement of gender component in projects, programmes, plans, policies etc. and the current development pattern of the nation but also it helps in developing appropriate gender mainstreaming strategies and there by policy making and development process.

Gender-disaggregated data can be applied to;

- Find out the different conditions of women and men, including changes over time;
- Consider and track the impacts of national activities on women and men;
- Find out and further define the problems, and then develop options and choose the most effective and beneficial one for both gender;
- Allocate resources and work in a fairer way;
- Evaluate and monitor outcomes and conclusions by gender;
- Present the progress or lack of women by indicators and regular data publications

There is a need to generate gender-disaggregated information/ data and performance indicators for monitoring purposes. Knowledge of appropriate tools for data collection and analysis is therefore required for proper interpretation from the collected information. This chapter briefly describes concept of scales of measurements, data types, sampling procedures, measures of central tendency and dispersions. The scope of describing the statistical tools for analyzing data is beyond the scope of the chapter. Therefore, proper analytical tools along with the situations when it should be used during analyzing experimental/ observational/ secondary data are listed. Further, concept of gender disaggregated data is introduced and a pre test evaluation schedule is used to describe how to bring the gender disaggregated data in a proper format for further analysis. The data is tabulated and described using MS Excel Software. All the statistical procedures enlisted in this chapter are described briefly. The details on all statistical procedures may be obtained from any standard statistics book.

Gender disaggregated data are the facts and figures (information) collected, analyzed and summarized for presentation and interpretation for each gender. All the data (information) collected in a particular study are referred to as the *data set* for the study. *Elements* are the entities/individuals on which data are collected. A *variable* is a characteristic of interest for the elements. In gender disaggregated data 'gender' is a mandatory variable. Measurements collected on each variable for every element in a study provide the data. The set of measurements obtained for a particular element is called an *observation*. Hence, the number of observations is always the same as the number of elements. The number of measurements obtained for each element equals the number of variables. Variables in gender disaggregated data can be either *qualitative* or *quantitative*. The data can be cross-sectional and time series data.

Qualitative data use labels or names to identify an attribute for each element. Scale of measurement of qualitative data is either nominal or ordinal. It may be nonnumeric or numeric.

Quantitative data use numeric values that indicate how much or how many. Scale of measurement of quantitative data is either interval or ratio. Quantitative data may be discrete or continuous. Quantitative data that measure how many are discrete. Quantitative data that measure how much are continuous because no separation occurs between the possible data values.

A qualitative variable is a variable with qualitative data and a quantitative variable is a variable with quantitative data. The type of variable (qualitative or quantitative) decides the statistical analysis appropriate for a particular variable. If the variable is qualitative, it is possible to summarize the data either by counting the frequencies in each qualitative category or by obtaining the proportion of the frequencies in each qualitative category; arithmetic operations are not feasible in such cases, whereas, arithmetic operations often provide meaningful results for a quantitative variable. Therefore, statistical analysis is limited for qualitative variables than that of the quantitative variables for which more number of alternatives are available in literature. Further, two more type of gender disaggregated data is possible: *cross sectional data* and *time series data*. This classification is based on time dimension. It is possible to obtain data for a number of variables at same point of time or at different time periods. If the data is collected at same point of time, it is known as *cross sectional data*, whereas, if the data is collected over several time periods is known as *time series data*. For cross sectional data, it is expected that all the data on different variables from different individuals/ units are independent. For time series data, as observations are taken from same set of individuals/ units over different time periods, it is expected that some relationship is present in the data. Therefore, it is important to distinguish between cross sectional data and time series data as different statistical tools are being used for analysis of these types of data.

Sources of Gender Disaggregated Data: Data can be collected either from secondary sources (collected by other organizations, government offices, private sector organizations etc.) or from statistical studies. Statistical studies are of two types: experimental studies and observational studies. In experimental studies the variables of interest are first identified. Then one or more factors are controlled so that data can be obtained about how the factors influence the variables. In observational (non-experimental) studies no attempt is made to control or influence the variables of interest. A sample survey is a good example of observational studies.

A *population* is the set of all the elements of interest in a study.

A *sample* is a subset of the population.

Different methods are used for collection of gender disaggregated data. Sometimes the whole population is of our interest and therefore, the whole population is our data set. For example, we are interested to study the variability in height of girl and boy students of a particular class in a particular school. The number of students (girl and boy) are fixed and it is limited, therefore, one can measure the height for all the students in the class, then the data set of all the students is the entire population of interest. This is feasible preferably when the number of elements (entities/individuals) is less. Instead if we have number of elements too high and it is not possible to collect data on all the elements, in such situation we need to restrict ourselves for a dataset which consist of a sample from the population. In most of the situations, we are interested/ forced to use the sample data set to draw some conclusions about the population under study, therefore, extra care is necessary and compulsory while collecting the sample from the population. Method of drawing conclusion about the population based on information from the sample is known as *statistical inference*.

Numerical characteristics of a sample, such as the sample mean and sample standard deviation, are called *statistic*. Numerical characteristics of a population, such as the mean and standard deviation, are called *parameters*. A statistic such as the sample mean is considered an *estimator* or a population *parameter* - the population mean. A sample mean provides an estimate of a population mean, and a sample proportion provides an estimate of a population proportion. A primary purpose of statistical inference is to develop estimates and test hypotheses about population parameters using information contained in a sample.

It is important to realize that sample results provide only *estimates* of the values of the population characteristics. The reason is simply that the sample contains only a portion of the population. With proper sampling methods, the sample results will provide 'good' estimates of the population parameters. But how good can we expect the sample results to be? Fortunately, statistical procedures are available for answering this question. Often the cost of collecting information from a sample is substantially less than from a population, especially when personal interviews must be conducted to collect the information. A list of well known sampling techniques are:

Non –probability Sampling

- ✓ Convenience sampling (purposive units)
- ✓ Judgement Sampling (own judgement)

Probability Sampling

- ✓ Simple Random Sampling
- ✓ Cluster Sampling
- ✓ Systematic Sampling
- ✓ Stratified Sampling
- ✓ Multi-Stage Sampling

The above procedures are useful for collection of data. The next step is to understand the data using descriptive and exploratory analysis. A list of measures of central tendency and measures of dispersion are as follows:

Measures of Central Tendency

Mean: The mean of a data set is the average of all the data values. The sample mean ($\bar{x}$) is the point estimator of the population mean (μ).

Sample mean $\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$; n is the sample size, x_i is a random variable

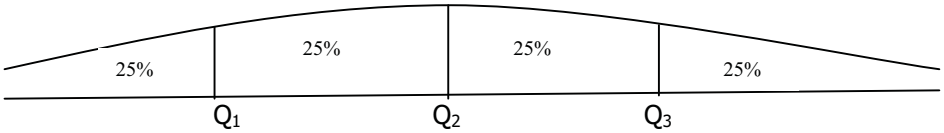
Population mean $\mu = \frac{1}{N}\sum_{i=1}^{N} x_i$; N is the population size, x_i is a random variable

Median: The median of a data set is the value in the middle when the data items are arranged in ascending order. With an odd number of observations, the median is the middle value. An even number of observations has no single middle value.

Mode: The mode is the value that occurs with greatest frequency. Situations can arise for which the greatest frequency occurs at two or more different values. In these instances more than one mode exists. If the data contain exactly two modes, we say that the data are bimodal. If data contain more than two modes, we say that the data are multimodal. In multimodal cases the mode is almost never reported because listing three or more modes would not be particularly helpful in describing a location for data. The mode is an important measure of location for qualitative data.

Percentile: A percentile provides information about how the data are spread over the interval from the smallest value to the largest value. For data that do not contain numerous repeated values, the p^{th} percentile divides the data into two parts. *The p^{th} percentile is a value such that at least p percent of the observations are less than or equal to this value and at least (100-p) percent of the observations are great than or equal to this value*. Colleges and universities frequently report admission test scores in terms of percentiles.

Quartile: It is often desirable to divide data into four parts, with each part containing approximately one fourth, or 25% of the observations.



Q_1 = first quartile, or 25th percentile

Q_2 = second quartile, or 50th percentile (also the median)

Q_3 = third quartile, or 75th percentile

Measures of Dispersion

Range: The simplest measure of variability is the **range**. Although the range is the easier of the measures of variability to compute, it is seldom used as the only measure. The reason is that the range is based on only two of the observations and thus is highly influenced by extreme values.

Range = Largest value - Smallest value

Interquartile Range: A measure of variability that overcomes the dependency on extreme values is the interquartile range (IQR). This measure of variability is simply the difference between the third quartile, Q_3, and the first quartile, Q_1. In other words, the interquartile range is the range for the middle 50% of the data.

Interquartile Range (IQR) = Q_3-Q_1

Variance: The variance is a measure of variability that utilizes all the data. If the data are for a population, the average of the squared deviations about population mean is called the population variance (σ^2). For a population of *N* observations and with μ denoting the population mean, the definition of the population variance is

Population Variance $$\sigma^2 = \frac{1}{N}\sum_{i=1}^{N}(x_i - \mu)^2$$

When we compute a sample variance, we are often interested in using it to estimate the population variance. It can be shown that if the sum of the squared deviations about the sample mean is divided by *n*-1, and not *n*, the resulting sample variance provides an unbiased estimate of the population variance. Therefore, the sample variance is

Sample Variance $$s^2 = \frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2$$

The units associated with the sample variance often cause confusion. Because the values being summed in the variance calculation are squared, the units associated with the sample variance are also squared. The squared units associated with variance make it difficult to obtain an intuitive understanding and interpretation of the numerical value of the variance.

Standard Deviation: The Standard Deviation is defined to be the positive square root of the variance. *s* is used to denote the sample standard deviation and σ to denote the population standard deviation. The sample standard deviation s is the point estimator of the population standard deviation σ.

Sample standard deviation $= s = \sqrt{s^2}$

Population standard deviation $= \sigma = \sqrt{\sigma^2}$

The standard deviation is measured in the same units as the original data. So the standard deviation is more easily compared to the mean and other statistics that are measured in the same units as the original data.

Coefficient of Variation: The coefficient of variation is a relative measure of variability; it measures the standard deviation relative to the mean. The coefficient of variation is usually expressed as a percent.

Population Coefficient of Variation $= \frac{\sigma}{\mu} \times 100\%$

Sample Coefficient of Variation $= \frac{s}{\bar{x}} \times 100\%$

In general, the coefficient of variation is a useful statistic for comparing the variability of variables that have different standard deviations and different means. For descriptive and exploratory data analysis along with the usual measures of central tendency and measures of dispersion the graphical tools also play an important role to describe the gender disaggregated data. Many times the data must be visually observed using proper graphical tools to understand the behaviour of the data or interrelationship between/among the variables. Bar chart and pie charts are mostly used for qualitative data where as histogram, dot plot, ogive, scatter plot, box

plot, stem and leaf display are mostly used for quantitative data. The above said basic statistical and graphical measures are important to visualize, understand & describe the data which further helps to explore the possibilities to further analyze the data for more in-depth interpretation that leads to identification of gender gaps. A number of statistical analysis tools are available to handle gender disaggregated data. The types of analysis depend on the following:

- Number of populations – one /two/more than 2
- Number of variables – one/two/more than 2
- Type of variables – nominal/ordinal/interval/ ratio
- Parameter types – mean/ variance/ median (mostly)
- Sample size – small/ large
- Sampling method– with/without replacement
- Auxiliary information- available or not
- Assumptions – distribution assumption (normal); continuous/discrete; independent observations; constant variance etc.

A collection of statistical tests/ procedures for analyzing gender disaggregated data based on above criteria can be found in http://bama.ua.edu/~jleeper/627/ choosestat.html (developed by Dr. James D. Leeper). Huge data collected from surveys cannot be understood and interpreted without analyzing the data using proper statistical tools. The data driven gender gaps obtained using proper statistical analysis helps the analyst/ experimenter to identify probable important factors of concern and the probable cause so that necessary steps may be taken for further corrections. Therefore, any experimenter is suggested to properly understand the concept of gender disaggregated data, collect gender disaggregated data, analyze with proper statistical tools for identification and quantification of gender gap and take further steps for gender mainstreaming.

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ENTREPRENEURIAL OPPORTUNITIES AND MARKET LINKAGES FOR WOMEN SHGs

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Self Help Group (SHG) movement involving rural women has been an important step forward in empowerment of farm women. SHGs are a symbol of collective strength of poor, voiceless women and serve as a platform to discuss their concerns and chalk out courses for collective action. Moreover what was not possible on part of individual woman is now possible for a group of women. Today women SHGs do have access to institutional sources of credit, linkage with different organizations for various kinds of services and capacity building to undertake different economic pursuits. Thus, women SHG movement in rural India over decades has created a solid foundation for transformation of rural India and agriculture sector. But experiences and evidences over year suggest that despite significant growth in the number of WSHGs, a large chunk of them have failed to attain sustainable growth in terms of economic and entrepreneurial progress. As a result, the members of those WSHGs have not really benefited economically from the opportunities being created around. The major activity in those SHGs is still confined to intra-group saving and lending. Every year while many new WSHGs come into existence, many do also become defunct and finally perish for certain reasons. Another aspect is that still there are many women who are not in the fold of SHG movement, but could contribute to development of group, family and community. Therefore, there is a need for women to come together as viable SHGs and for the existing groups to become strengthened so as to function cohesively, increase their bargaining power and make best use of available opportunities. In other words, sustainability of WSHGs and their empowerment both at group and member level, and making the existing WSHGs the real vehicle of rural transformation remain the key issues.

Entrepreneurship development

Entrepreneurship is the process of starting a business by acquiring financial, physical, technical and human resources in relevant areas and developing the required management skill to run the business successfully. Broadly speaking, entrepreneurship involves two things; an enterprise and capacity building to establish and run the enterprise. In reality, there is a big gap to bridge between a Women SHG and Group Entrepreneurship. Despite the fact that now-a-days a lot of efforts are being made to impart training to women members on SHGs for their knowledge and skill development so as to enable them to grow as business units, we have so far achieved a limited success on this front. There could be a number of reasons for such a state of affairs. What remain as some of the key issues are the availability of the entrepreneurial opportunities and the means of tapping those opportunities. The first part is related to market; the second part is related to the capacity of the WSHGs to develop enterprises and get market access.

Though in recent years, markets have expanded and diversified, thus creating opportunities for entrepreneurs, at the same time, risk and uncertainty in the market has also increased. Therefore, for tapping entrepreneurial opportunities a SWOT analysis of the situation should be undertaken. Some of the points that should be paid attention are:

- Assess the market opportunities in terms of type, size, number of competitors etc.
- Explore the possible entrepreneurial avenues for WSHGs in a given situation
- Identify the products/services that has good scope for future growth and try one or two products
- Establish linkages with R&D organizations for science and technological know-how and management skills to build up the enterprise
- Pay attention to primary level value addition in case of commodities for better quality
- Look for small and immediate markets to begin with
- Target particular group(s) of clientele in early periods of development
- Start the business with small investment
- Developing leadership and skill among members is critical for success of WSHGs
- Look for change in approach to marketing including product differentiation based on feedback

How to link women to market

There could be different approaches to link women groups to market depending on the situation. But all may not be equally effective. Described below are few marketing models that was tried under a project involving rural women dealing with ornamental fishes which may offer some insights as how to go about linking WSHGs to markets.

Model-1: Linking women producers to the traders

a) Action

Participating women were taken on exposure visits to ornamental fish market in Bhubaneswar. Interfaces between women and traders were also arranged. Women not only got an opportunity to develop acquaintance with traders, but also gained knowledge about different ornamental fishes, places of procurement and their market prices. An understanding was also reached on the prices to be paid by the retailers to the women for purchasing different species of ornamental fishes.The arrangement worked nicely for few six months. Women could sell the fishes to the traders at prices as agreed upon earlier.

b) Constraints

Women producers from their side had the constraints like difficulty in traveling long distances, spending long hours; high marketing cost and risk of mortality/loss during marketing process. At the same time they had also to face the constraints created by the retailers. Delay in settlement, pressure tactics like sending back their consignments citing various reasons, offering low prices, selectivity in accepting fishes were some of the constraints created by middlemen that discouraged women producers. In absence of a suitable marketing outlet, inventories i.e. quantum ornamental fishes with producers increased manifold creating space constraints. While many fishes died due to over-crowding, women had to disposed off the fishes here and there incurring losses. All these developments dampened the spirit of women producers and led to slow down the units.

Model-2: Linking producers to an established entrepreneur in the locality

a) Action

Following discouraging outcomes from earlier model, a prospective and established entrepreneur was identified to provide a viable marketing channel to the producers. Meetings were arranged between women and the entrepreneur in presence of project scientists. An informal agreement was reached to maintain the supply and demand streams. A mechanism was worked out for pricing of ornamental fishes. Under the mechanism;

- the entrepreneur offered a price 20-25% lower than the prevailing price in Bhubaneswar for different fishes market and would collect fishes from the units
- Prices were subject to monthly review by both the parties
- Both male and female fishes were accepted by the middlemen entrepreneur
- Dues were settled on weekly and fortnightly basis

The arrangement worked for about six (6) months and women producers could get more income from their units than what were getting in earlier model. The arrangement also brought in good dividend to the entrepreneur as he could successfully meet demands from outside during peak periods.

b) Constraints

Problems cropped up after six months of smooth working of the model. With increasing output from the units, supply situation of ornamental fishes improved considerably. But the entrepreneur-middleman had a difficult situation to cope with. The chain of reactions that followed is;

- Difficulty in maintaining increased volume of inventories due to space constraint and high maintenance cost
- Off take from units reduced as fishes could not disposed off in the market
- In the face of increasing size of inventories, the entrepreneur offered low price to the women producers, and was irregular in collecting fishes
- Irregular settlement and low price created mistrust between parties

The breakdown of the mechanism led to drop in income of producers, slow down of production units and closure of two units.

Model -3: Networking and Pivoting

Another model called 'networking and pivoting' was tried. The model basically focused on promoting aquarium -keeping in rural and semi-urban areas and creating new markets for ornamental fishes to sustain ornamental fish production.

a) Action

A network of ornamental fish production units in a locality was made and an educated youth was identified who, apart from supervising the units, had the responsibility of procuring and selling the fishes. He was given necessary orientation and training to take care of units. At the same time he was imparted training in aquarium preparation. Here the strategy was to popularize ornamental fishes in semi-urban areas and create new markets.

b) Outcome

The model yielded good results. There was a new found interest in aquarium keeping amongst the people. As a result the sale of aquaria in the locality increased, so also the production of ornamental fishes. As a result the women managed production units could generate an additional income of Rs225 –Rs550/- per quarter. The arrangement not only made the units sustainable but also created multiplier effect in the area through expansion of existing units and establishment of more number of units in neighbouring areas.

But the risk factor in this case was that the possible switch over by the youth concerned to another business.

Thus the above discussion suggests that developing WSHGs as entrepreneurs is a very challenging task. It really needs meticulous planning to infuse the entrepreneurial spirit into the WSHGs and prepare the members for collective action. What is needed most is an educated and devoted woman who could anchor as leader and group of committed members. In short, capability of the WSHGs to establish, consolidate and grow with an entrepreneurial activity holds the key.

The models described above was tested under the project 'Economic upliftment of rural women through integrated fish farming and ornamental fish production' funded by Department of Biotechnology, Govt. of India and implemented at DRWA.

GENDER-FRIENDLY AGRICULTURAL TECHNOLOGIES

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Role of farmwomen in agriculture is perhaps to an even greater degree than other areas of development because they are active at every point in the food chain throughout the world and are often responsible for protecting the integrity of food and ensuring its wholesomeness and safety. Food security as a national objective is placed on the policy agenda. Now people have started to give emphasis on quality food production (ICAR vision 2050) due to pesticide residues in food chain and increasing demand of WTO. Need for Gender-friendly Agricultural Technologies has gained considerable importance at the national level to streamline technical/extension services for farm women. ICAR - Directorate of Research on Women in Agriculture is the pioneering organization to refine the agricultural technologies in gender perspective. Rural women entrepreneurs face several risks and problems out of which technical risks is the major one (Srivastava *et.al,* 2007). Due to incresing migration of man towards urban areas it is forecasted that future agriculture will be in the hands of farm women. Millennium Development Goals adopted in the year 2000 under, the aegis of the UN General Assembly, setting the goals to be achieved by the nations of world by 2015 are empowerment of women and reduction in gender inequalities and improved environmental sustainability. Enormous progress has been made towards achieving the Millennium Development Goals, (MDGs). Even then post- 2015, efforts to achieve a world of prosperity and equity will continue

Pesticide residues in food and animal feed have been a matter of considerable concern. Pesticides enter human system either through direct consumption of the contaminated food or through milk, meat and other products obtained from animals fed on contaminated feed and fodder. Crops treated with pesticides invariably contain small amount of these chemicals and the hazard depends on the nature of pesticide, crop, cultural practices and various other environmental conditions under which the crop is grown or treated commodity is stored. Having to live with pesticide use, attempts have been made to ensure that the residues are kept at minimal level so that the health risk due to their ingestion is minimized, if not eliminated. To regulate pesticide residues to safe levels commission has laid down principles for aiming at the maximum residue limits of pesticides on food commodities. Pesticide residues in food are dealt with by the Codex Committee on Pesticide Residues (CCPR), hosted by the Netherlands government. It is a committee that forms a subsidiary body of the Commission under The Joint FAO/WHO Food Standards Programme. Codex has become the basis of international food standards for trade between member countries of the World Trade Organizations (WTO).

Women are the major decision-makers in ensuring nutrition to the next generation as they provide primary nutrition to the young children. A study conducted by FAO, WHO, and UNEP broadly estimates that between 1 million to 5 million cases of pesticide poisoning occur each

year, resulting in several thousand fatalities. Pesticide fatalities are overwhelmingly a developing country phenomenon. About 1/3 of the pesticide poisoning cases in world are reported from India only. Some of the vegetables like ladies finger, cauliflower, pointed gourd and brinjal are dipped directly in the pesticide solution to improve their appearance.Although developing countries use just 25 percent of all pesticides produced, 99 percent of deaths from pesticide poisoning occur in developing counties. Children and women are specially at risk. So, there is an urgent need to empower women in Gender friendly Agricultural technologies for sustainable quality food production.

Pesticide Use in Crop Protection v/s Health Hazards

Since before 2500 BC, humans have utilized pesticides to protect their crops. The first known pesticide was elemental sulphur dusting used in Sumeria about 4,500 years ago. By the 15th century, toxic chemicals such as arsenic, mercury and lead were being applied to crops to kill pests. In the 17th century, nicotine sulfate was extracted from tobacco leaves for use as an insecticide. The 19th century saw the introduction of two more natural pesticides, pyrethrum which is derived from chrysanthemum and rotenone which is derived from the roots of tropical vegetables. In 1939, Paul Muller discovered DDT as a very effective insecticide. It quickly became the most widely used pesticide in the world.Some sources consider the 1940s and 1950s to have been the start of the "pesticide era". Organochlorine insecticides were commonly used in the past, but many have been removed from the market due to their health and environmental effects and their persistence. In the 1960s, it was discovered that DDT was preventing many fish-eating birds from reproducing, which was a serious threat to biodiversity. An example of a widely misused DDT pesticide, which was brought to public attention by Rachel Carson's book, Silent Spring was the reduction of the thickness of the egg shells on predatory birds. The shells sometimes become too thin to be viable, causing reductions in bird populations. This occurs with DDT and a number of related compounds due to the process of bioaccumulation, wherein the chemical, due to its stability and fat solubility, accumulates in organisms' fatty tissues. Also, DDT may biomagnify which causes progressively higher concentrations in the body fat of animals farther up the food chain. DDT is now banned in at least 86 countries, but it is still used in some developing nations to prevent malaria by killing mosquitoes. Short term insecticides are often used in homes and dwellings where children, people and domestic animals might be exposed. Most organophosphate insecticides were developed during the early 19th century, but their effects on insects, which are similar to their effects on humans, were discovered in 1932. Some are very poisonous were used in World War II as nerve agents. However, they usually are not persistent in the environment. Organophosphates have an additive toxic effect to wildlife, so multiple exposures to the chemicals amplify the toxicity. A number of the organochlorine pesticides have been banned from most uses worldwide and globally they are controlled via the Stockholm Convention on persistent organic pollutants (POPs). These include, aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex and toxaphene. Pesticides are used in grocery stores and food storage facilities to manage rodents and insects, may be harmful to farmwomen. Rodenticides are chemicals used to control rats, mice, bats and other rodents by most of the farmwomen at household level. Chemicals, which control other mammals, birds, and fish, are also grouped in the category of rodenticides by regulatory agencies. Most of the times suicide cases of farmwomen have been reported with the use of rodenticides and insecticides used for stored

grain pests. Each use of a pesticide carries some associated risk on human health and women are worst affected by these risks.

Crop protection strategies - the management of pests, diseases, and weeds have changed dramatically over time. The intensification of agriculture alters agricultural practices significantly. For example, in intensive agricultural systems, more traditional and labour intensive physical and biological crop protection measures are superseded by pest resistant varieties and more capital intensive use of pesticides. In marginal areas, the generally small returns to these expensive chemical inputs make them difficult for farmers to use. Genetically modified technology in crop protection is still poorly understood in many settings, specially with respect to gender differences. Pesticides can increase agricultural productivity, but when handled improperly, they are toxic to humans and other species. Pesticide fatalities are overwhelmingly a developing country phenomenon. Although developing countries use just 25 percent of all pesticides produced, 99 percent of deaths from pesticide poisoning occur in developing counties. Many farmers in developing countries overuse pesticides and do not take proper safety precautions because they do not understand the risks and fear smaller harvests. Making matters worse because pesticides banned or restricted in industrialized countries are used widely in developing countries. Farmers' perceptions of appropriate pesticide use vary by setting and culture. Additional negative environmental effects and socioeconomic costs include the debt incurred by farmers to purchase these inputs, the loss of local knowledge and practices once used to protect crops, and dependence on external sources of inputs. As with so many capital intensive technologies, the poor, including women and children, are the ones least able to benefit from their use. Recent research in India, for example, shows that small scale and marginal farmers take loans from private finance corporations to purchase inputs and then, unable to pay their debts, become answerable to moneylenders (Mancini and others 2005). The same study also found marginal farmers to have a 10 times greater risk of severe pesticide poisoning then large scale farmers.

People have started realizing the present state of continuous ill health is due to the increasing quantity of poison accumulating in their bones and tissues. Mrs Sunita Narain, Director, Centre for science and environment, reported traces of 6 to 13 pesticides mainly monocrotophos, chlorpyriphos and cocktail of phosphamidon and malathion in blood samples of Punjab farmers (June, 2005), which causes infertility and cancer. Certain organo-chlorine pesticides in blood samples from Punjab were found to be 15 to 60 times higher than those of US population. We are living in an age, where neither the water we drink nor the food we eat can be guaranteed free from pollution. The whole food chain is contaminated. However, the increasing consciousness of safe, healthy and quality food is increasing not alone at global front but India too. While performing different plant protection operations at household level specially for storage of food items, storage of pesticides brought for field crops, pest management of kitchen garden in homestead lands, reuse of pesticide containers, preparation of spray solution for spraying without personnel protective equipments (PPE) and weeding in field crops sprayed with pesticides; farm women get exposed to a variety of chemical pesticides and suffer with various adverse health effects due to lack of information and technological empowerment

At present a big questions how to achieve the quality food without environment disturbance. This is just possible. The ways to do are:

a) Judicious use of pesticide.

b) Development of safer, effective, target oriented molecules.
c) Use of IPM (Integrated Pest management) and IRM (Insecticide Resistance Management)
d) Stricter control on spurious pesticide use
e) Precision pesticide application, Enhanced use of seed treatment and newer pesticide application techniques.
f) Pesticides monitoring mechanisms for Phyto Sanitary issues.
g) Enhanced use of ICT and forecasting and forewarning.

In India, women bear most of the responsibility for selecting and storing seeds for the next season. In Nepal, women have almost full responsibility for seed selection, sowing, weeding, fertilizer and pesticide application, harvesting and threshing of rice in the mountain area. While performing different plant protection operations at household level specially for storage of food items, storage of pesticides brought for field crops, pest management of kitchen garden in homestead lands, reuse of pesticide containers, preparation of spray solution for spraying without personnel protective equipments (PPE) and weeding in field crops sprayed with pesticides; farm women get exposed to a variety of chemical pesticides and suffer with various adverse health effects due to lack of information and technological empowerment.

Pesticides and Toxic Waste alter DNA

A two year study commissioned by the Punjab pollution control board (PPCB) in November, 2007 and conducted by Chandigarh, s postgraduate institute of medical education and research (PGIMER) in 25 Punjab villages located near 5 open drains in Jalandhar, Ludhiana and Amritsar districts, has some of the following alarming situation:

1. Significantly high rate of miscarriages among women and slow growth in children.
2. Pesticides have also been detected in vegetables, blood as well as human and cattle milk samples.
3. Evidence of genotoxicity in some cases.
4. DNA mutations in 65 percent of the blood samples.
5. Drinking water has turned toxic due to high concentration of heavy metals such as mercury, copper, cadmium, chromium, and lead. These chemicals have seeped in to the village's groundwater from the polluted drain water. Evidence of these metals entering the food chain.
6. Gastrointestinal, skin, eye, dental and bone problems significantly higher in these areas compared with villages not in proximity of drains.
7. Early symptoms of neurotoxicity.
8. Children complain of rashes and boils.
9. Old men insist their hands and fingers are turning numb.

In the Andean regions of Bolivia, Colombia and Peru, women develop and maintain the seed banks on which food production depends. In Philippines women are affected by the misuse and mishandling of pesticide containers. This, of course, also affects their children's health. Thus women friendly IPM technologies to increase safety with reduced drudgery are the need of hour at country level as well as at global level. A growing imbalance exists between women's access to IPM technologies to increase safety with reduced drudgery on the one hand and the demands of production on the other.

Integrated pest management technologies with the use of multiple approaches to control pests, is becoming widespread and has been used with success in countries such as Indonesia, China, Bangladesh, United States, Australia, India and Mexico. Rural women are slowly coming forward to manage independently their farm enterprise as well as family headship. Men who were previously engaged purely in agriculture are migrating to other places for non-farm jobs available at urban and semi-urban places. Therefore, it is expected that farming and allied enterprises may go to the hands of rural women and they require technological knowledge to face the future responsibilities.

The following components may be included for gender friendly agriculture technologies for quality food production.

1. Ecology based Pest Management

Various eco-friendly tactics of pest management have to be integrated to avoid the use of chemical pesticides. The knowledge of interaction among plant, pest, natural enemies and environment is essential for effective pest management. When man disturbs balance of nature, nature strikes back in the form of pest outbreaks. Some examples of pest outbreaks are as follows:

- White flies in cotton
- *Helicoverpa armigera* in cotton
- Slug caterpillar in coconut
- Eriophyid mite on coconut

Moreover, the pest status changes over the years due to interaction of various biotic and abiotic factors. One has to thoroughly understand the reasons for outbreak of pests and their changing status and plan the management practices accordingly so as to prevent further outbreaks.

2. Habitat Diversification

Habitat diversification makes the agricultural environment unfavourable for insect pest population growth multiplication and establishment. The following are some approaches by which the pest population can be brought down.

2.1 Ploughing, hoeing and basin preparation

Cultural practices like ploughing, hoeing and basin preparation influence directly, the survival of soil inhabiting pests. These routine agricultural operations expose soil inhabiting insect, pests and other arthropods and nematodes to harsh weather and to natural predators. Insects are most vulnerable when in the pupal stage and most insect-pests pupate in the soil, which furnishes a protective habitat. Birds like the king crow, the myna, the starling, etc. pick up the exposed pupae following these cultural operations. Some insects e.g. grasshoppers, crickets, mole crickets and borers lay their eggs in the upper layers of the soil. These eggs exposed during soil preparation and desiccated subsequently. Many insects like cutworms; grubs of the root borer and white grubs, which feed on the root system of plants, are also exposed to the vagaries of the elements during basin preparation and hoeing. Ploughing the field after summer showers, removing the crop debris from the field, exposing the different stages of insects viz., egg, larvae and pupae to sunlight greatly reduce the pest abundance and prevent the pest population buildup. Deep ploughing carried out during winter helps in reducing the over

wintering populations of several pests. Afore- mentioned cultural operations are performed manually using locally made tools and implements. Beside dislodging the pests from their protective habitat and subjecting them to unfavorable conditions for survival, these scientifically tempered cultural practices also improve aeration of the soil and facilitate proper percolation of water into the soil. However, the degree of success of these operations is related directly to the presence of natural predators in adequate numbers and the synchronization of these operations with the vulnerable stages of the pest's life cycle.

2.2 Intercropping system

Intercropping system has been found favourable in reducing the population and damage caused by many insect pests due to one or more of the following reasons:

- Pest outbreak less in mixed stands due to crop diversity than in sole stands.
- Availability of alternate host.
- Decreased colonization and reproduction in pests
- Chemical repellency, masking, feeding inhibition by odours from non-host plants.
- Act as physical barrier to plants.

Few examples like Interplanting maize in cotton fields increased the bio control agents population of Araneae, coccinellidae and chrysopidae compared with control fields. Maize also acted as a trap crop for *H.armigera* reducing the second generation damage to cotton . Intercropping pulses in cotton reduced the population of leafhopper and Lablab bean in sorghum reduced the sorghum stem borer incidence. Hence, appropriate intercropping systems have to be evolved where reduction in pest level occurs.

Intercropping sorghum with other crops has been shown to reduce *C.partellus* damage on sorghum, urdbean, pigeon pea, cowpea and lablab bean. The incidence of groundnut leaf miner, *Aproaerema modicella* was highly reduced when groundnut was intercropped with cowpea of blackgram at the ratio of 3:1 and with pearl millet at a 4:1 ratio. The latter case increased natural enemy activity and reduced the requirement for one round of insecticide spraying and increased yield. Sowing cowpea (1:4) as intercrop with groundnut minimizes leaf miner infestation. Growing cowpea as intercrop also helped in attracting the female moths to lay more eggs on it and for early detection of occurrence. Intercropping system of groundnut and Bajra at 6:1 ratio had lowest leaflet damage by leaf miner (41.23%) and larval numbers (2.57) per plant followed by groundnut + cowpea, which had 49.26 percent and 3.10 larval number as compared to 64.56 and 4.13, respectively in groundnut pure crop. Greengram var.Co2 intercropped with sugarcane recorded 77 percent decrease in sugarcane early shoot borer incidence over control. Intercrop of soya bean, green gram, black gram etc. has been reported to reduce weeds as well. Sunhemp has been interplanted with potatoes to deter the potato blight fungus, *Phytophthora infestans*. Intercropping with onion and garlic is recommended for nematode control. The damage of cotton ash weevil was more pronounced when eggplant was grown as intercrop cotton or as preceding crop, since both are preferred hosts for it.

2.3 Trap cropping

Plantings of the susceptible or preferred crop of a pest grown near the main crop to attract insects or other organisms like nematodes to protect target crops from pest attack. Beneficial effect of trap cropping is achieved by

- Either preventing the pests from reaching the crop or
- Concentrating them in a certain part of the field where they can be economically destroyed.
- Growing trap crops like marigold which attract pests like American bollworm by lay eggs, barrier crops like maize/jowar to prevent migration of sucking pests like aphids and guard crops like castor which attracts *Spodoptera litura* in cotton fields. Growing mustard as trap crop, 2 rows per 25 cabbage rows for the management of diamond back moth. First mustard crop is sown 15 days prior to cabbage planting or 20 days old mustard seedlings are planted. Growing castor along the border of cotton field and irrigation channels act as indicator or trap crop for *Spodoptera litura*. Planting of 40-day-old yellow African tall marigold and 25-day-old tomato seedlings (1:16 rows) or *Bidil rustica* tobacco around tomato (1:5) simultaneously reduces *Helicoverpa* damage. All the eggs of *Heliothis armigera* deposited on yellow *Tagetes* flowerbuds could be destroyed by the inundation of *Helicoverpa* adapted strain of egg parasitoid (*Trichogramma chilonis*). The main crop of tomatoes is also sprayed with either HaNPV or Bt, both of which are compatible with *Trichogramma.*

2.4 Companion plants

Companion plants constitute a form of biological control - the use of living organisms to manage unwanted pests and disease organisms. *Cannabis* plants have been grown as companion plants alongside crops, which require this protection. *Cannabis sativa* growing near cotton exerted a "protective influence" against cotton worms *(Alabama argillacea,* then called *Aletia xylin*a). Similarly,sunhemp grown around vegetable fields safeguarded the fields from attack by a cabbage caterpillar, *Pieris brassicae*; potato fields were protected against the potato beetle, *Leptinotarsa decemlineata* ; wheat suffered less damage by the root maggot, *Delia coarctata* ; and root exudates of *Cannabis* repelled underground larvae of the European chafer *Melolontha melolontha*. *Cannabis* suppresses the growth of neighboring plants, whether they are noxious chickweed, *Stellaria media* or valuable crops such as lupine, beets, brassicas and maize . For the control of nematode *Chamanthi* (*Chrysanthemum coronarium*) , a flowering plant is raised on the borders of tomato fields.

2.5 Crop rotation

Crop rotation breaks pest life cycles, often improves tilth and fertility. Sustainable systems of agricultural production are seen in areas where proper mixtures of crops and varieties are adopted in a given agro-ecosystem. Monocultures and overlapping crop seasons are more prone to sever outbreak of pests and diseases. For example, growing rice after groundnut in garden land in puddle condition eliminates white grub. Crop rotation with non-host crop e.g. Sorghum, sesamum, wheat and barley reduced the incidence of root knot nematode. Crop rotation with French beans reduces the bacterial wilt disease. Sorghum bicolor (Johnson grass) is grown as fodder crop in April –May. After harvesting the crop, brinjal is planted by keeping roots of Johnson grass in the field. This results in zero incidence of wilt disease in moderately infested plots.

3. Host Plant Resistance

Use varieties that are resistant to common pest species. Host plant resistance forms an important component of IPM. Several resistant varieties of crops have been evolved against

major pests, through intensive breeding programmes. Development of varieties with multiple resistances to several pests and diseases is essential. Uses of resistant varieties reduce the cotton ash weevil damage. In rice, resistant varieties viz., MDU 3 (Gall midge), PY 3, CO42 (Brown plant hopper) should be used. To resist sorghum shoot fly incidence CSH 15 R can be used. Groundnut resistant varieties like Robut 33-1, Kadiri 3, ICGS 806031 should be grown in endemic areas to reduce the risk of thrips damage and bud necrosis disease in case of cotton, whitefly tolerant varieties like JGJ 14545, LK 861, Supriya and Kanchana should be grown in endemic areas (Regupathy et.al., 1997). Use less susceptible varieties of brinjal like SB 17-4, PBR-129-5, Punjab Barsati, Arka Kasumkar, Pusa purple round, Punjab Meetam, Pusa Purple Long and Surti Gota against shoot and fruit borer.

4. Physical Method of Pest Control

Physical, (devices and procedures used to change physical environment of pest populations), methods of pest control are the oldest of all such insect control methods. These are rooted in simple practices that man, as a farmer, has leant from his long and close association with pests. These aid him in reducing pest populations to low levels. These include both direct and/or indirect measures which may be preventive or corrective in nature but are essentially slow acting, often ecofriendly, cost effective and compatible with other methods of pest control.

5. Mechanical Methods of Pest Management

Mechanical methods of pest control are essentially slow acting, often ecofriendly, cost effective and compatible with other methods of pest control. These characteristics make them amenable to blend better with other methods of pest control even though they do not bring about an immediate or drastic reduction in pest populations. Modern concept of pest control does not emphasize the outright eradication of pests but focuses on maintaining their populations at levels, which do not cause economic losses. Some of the mechanical methods of pest management include:

5.1 Light traps in pest management

Nocturnal insects responding positively to light, e.g. defoliating beetles, moths of Bihar, hairy caterpillar, tomato fruit borer, tobacco caterpillar, and *cerambycid* beetles etc. are collected, using light source or by trapping them in a light-trap and are subsequently destroyed. The light traps could be used both for monitoring and as a means of control. Rice stem borer and the brown plant hopper responded more towards yellow light source, while the rice leaf folder and green leaf hoppers *Nephotettix virescens* and *N.nigropictus* responded to green light source. Food and light traps are the major mechanical pest control methods cited by the farmers. Rodents which damage the paddy are controlled by using food traps, while insect pests are caught in light traps.

5.2 Yellow sticky trap

White coloured traps are most effective in attracting the pigeon pea fly, *Melanagromyza obtuse* yellow colour attract cotton whitefly, *Bemesia tabaci*, cotton aphids, *Aphis gossypi* G. and green house white fly. *Trialeurodes vaporarioru* .. Models combining the sticky trap with water pan have also been developed in increase the insect catch. Sticky traps are generally used with pheromones . A sticky substance derived from *Artocarpus heterophyllus* is also applied to the winnowing fan to control flies.

6. Use of Hormone

The basic studies of insect physiology have evolved the successful use of insect hormones in minimizing the pest population. The prime candidate for developing hormonal pesticides is the Juvenile hormone that all insects secrete at certain stages in their lives. It is one of the three internal secretions used by insects to regulate growth and metamorphosis from larva to pupa and pupa to adult. The Juvenile hormone is secreted by *corpora allata*, which is in the form of two tiny glands in the head. Besides, Ecdysone is secreted from thoracic gland, which causes pupation and maturation in insects. These hormones have been shown to alter the course of development in insects abruptly when applied at appropriate time and in turn it may be used as pesticides. Carroll M. Williams was first to synthesize cecropia crude juvenile hormone.

7. Use of Insect Pheromones

Pheromones are chemical substances released by insects, which attract other individuals of the same species. Pheromone trap catches are highest when wind is from the East. Sex pheromones have been used in pest management in the following ways:

a. Monitoring
b. Mating disruption
c. Mass trapping

Pheromones are naturally produced chemicals used by animals to communicate to each other. There are three basic types of pheromones. Aggregation pheromones attract many individuals together, for example, a site where food may be plentiful. Sex pheromones are used by one sex of a species to attract a male. Trail pheromones are deposited by walking insects, such as ants, so that others can follow. Synthetic pheromones produced in laboratories mimic these natural chemicals. They are used to attract pest insects into traps, disrupt mating, and monitor populations of insects. Because they do not leave any residual effect they are considered gender friendly tools in order to reduce health hazards of farmwomen. In some cases women have had to walk long distances to fetch water to prepare pesticides for cotton production, and switching to pheromone trap based pest control lightened women's labour.

8. Using Farmers Wisdom (ITKs)

The knowledge that indigenous people have regarding ecology, biodiversity and land use management is embedded in their belief system, their culture and religion. They have evolved ecologically sound technologies to deal with issues related to eco-friendly pest management. Traditional knowledge was perceived as a social responsibility albeit a paid one. Growing commercialization and industrialization over the last two decade has eroded this commitment adversely affecting the quality of care. In the context of global change, scientific validation of traditional knowledge has assumed greater significance. Around the world, there is growing interest in finding alternatives to the industrial farming methods that have emerged during the 20^{th} century. One approach is to build upon traditional methods, which evolved over the first 10,000 years of agriculture. Farmers use scarecrows or puppets to frighten rats. They believe that sulphur generates a repelling smell that kept wild boars away from the farm. Farmers said that certain religious practices, like the offering of food, flowers, and lighted oil lamps, would reduce pests. From a scientific perspective, this offering makes sense: birds are attracted to the food while insect pests are attracted to the light. This allows the birds to prey on the

destructive insects. These indigenous methods are time- tested, environmentally safe and economically viable.

9. Use of plant products/botanicals as Novel pesticides

The extensive studies have been made on the use of plant derivatives both as crude preparations and as commercial formulations against several field crops without affecting their natural enemies. It is estimated that 100 grams of ground neem powder when mixed with 10 litres of water is capable of repelling pests as foliar spray. Similar economical on-farm solutions should be made available to poor and marginal farmers to protect their crop from solutions should be made available to poor and marginal farmers to protect their crop from pest infestation. Some of the insect pests which can be effectively controlled by botanical pesticides include brown planthopper , *Nilaparvata lugens* (stal); green leafhopper, *Nephotettix* spp, tobacco cutworm, *S. Litura*; leaf folder, *Cnaphalocrocis medinalis* (Guenee); gram podborer, *Helicoverpa armigera* (Hubner) and stored product pests. They are also capable of controlling sheath rot and rice tungro virus disease in rice, and tobacco mosaic virus disease in tobacco. The most important consideration in gender friendly plant protection techniques is that we should not depend on any one method of pest control and other options of biological, cultural, physical and chemical methods are carefully, plant based pestcides like azardirachtin, nicotine, rotenones, ryanodines and annonins, etc. offer considerable promise in pest management.

Recent studies have also indicated the presence of photo-activated Secondary Phyto Chemicals (SPCs) (Photosensitizers/phototoxins), i.e they become toxic to insects in the presence of light . These SPCs are involved in the plant defence mechanisms against insects. Such naturally occurring solar powered toxins are an attractive alternative to chemical pesticides because they are biodegradable . The farmers identified plants which could resist and repel insects. *Diospyros affinin, Anamirta cocculus, Ananas comosus, Euphorbia antiqourum, Garyota urens, Pongamia pinnata, Crotolaria retusa, Cycos circinalis, Cymbopogon citratus, Areca catechu, Cocos nucifera, Carica papaya*, and *Coleus amboinicus* are some of the plant species used for botanical pest control. The fruits, leaves, bark and seeds of these plants are crushed, cut into pieces, and then buried, hung, or distributed in and around the field.

Some successful examples of gender friendly plant protection techniques for safe environment reported by various workers viz; Srivastava and Singh (2000), Srivastava (2001), Dimetry *etal.* (2002), Prakash and Rao (2002) and Shivankar *etal*. (2002) etc., are compiled and given below:

1. Spraying of Neem kernel 5 kg → 100 liter water → 8 hrs. → 100 ml teepol or100 gm soap→ 500-liter water/ha → green plant hopper.
2. Spraying of 3% neem oil → Yellow mosaic disease in Urd (*Vigna mungo*).
3. Spraying of Neem kernel extract or *Melia* →Kernel Extract 10% → *Earias vitella* in Okra.
4. Spraying of 5% NSKE with garlic controls jassid infestations in cotton crops.
5. Spraying of Neem seed kernel powder 1 kg → 5 liter water → Citrus leaf miner.
6. Furrow application of Neem leaf powder @75kg/ha→ mustard sawfly, pea and chickpea pod borer.
7. Spraying of Neem soaps 10 gm/ liter of water→ cabbage pest.

8. Spraying of Neem leaf 1 kg→ 10 liter water → 4 days in shed → vegetable pest in kitchen garden.
9. Spraying of Kernel of yellow Kaner (*Vitis nerrifolia*) 15-30 gm → Soap 15-30 gm → Water 10 liter → White Fly, Thrips and Caterpillars.
10. Placing of Naphthalene bolls (3) monthly basis in upper 3 leaf sheath of coconut for the control of black headed caterpillar.
11. Spraying of Leaf extract of bael (*Aegle marmelos*) → Blight disease of Tomato and onion.
12. Spraying of Oak leaves extract 10% → Bud necrosis disease in groundnut.
13. Spraying of Lantana and basil leaves extract→ Leaf miner in bean, brinjal, tomato, chili and onion.
14. Furrow application of *Argimone*, *Acacia* & *Calotropis* leaf powder→ Root Knot nematode.
15. Spraying of Tobacco leaf or *Calotropis* leaf 1.5 kg →water 3-liter → Boil → cool→ 15-liter water → vegetable and crops pests.
16. Spraying of 20 kg Jowar leaf or coconut leaf or *Bougainvillea* leaf or Doob (*Cynodon dactylon*) → 50 liter water → Heat 60°C for 1 hr→ cool→ water 200 liter →Viricide.
17. Application of Dry leaf powder of Senwar *Begunia (Vitex negundo),* wild sage (*Lipia geminata*), Bael (*Aegle marmelos*), Wild basil (*Ocimum canum*) 1 : 100 part of paddy → storage pest.
18. Spraying of Oil of white batch (*Acorus calamus*) 0.1% with water →Dip Gunny bag for 5 minute → Dry → storage pest of *Vigna radiata.*
19. Application of Papaya leaf powder 1 gm/5 kg pulses → *Callosobruchus chinensis*.
20. Spraying of Kernel extract of Karanj *(Pongamia glabra*), Mahua (*Madhca longifolia*), Bada Kulanjan (*Alpinia indica*), Castor (*Ricinus communis*) or oil and white kaner (*Nerium odorus*) root extract @ 1.5% → insect pest of citrus group.
21. Spraying of Tobacco decoction and 5% Neem seed kernel extract (NSKE) is effective against aphids at the early stage of the cotton crops (up to 45 days).
22. Spraying of Cow urine is effective against reddening of the leaf and boll rots in cotton crops.
23. Spraying of Lantana is reported to be effective against termite.
24. Soaking of packing sacks for 5 minute with Sweet flags *(Acorus calamus* L.) @0.1% v/v in water prevented cowpea beetle *(Callosobruchus chinensis* Fab.) oviposition on the sac and development of infestation upto 5 months.
25. Application of a mixture of Paste of neem leaves and green kernels (1kg) +Curd (2 liter) + Cow urine (1 liter) +Tobacco (250 gm). All materials keep in a earthen pot mouth tied with cloth under the shade of tree for 1 month. Filter the solution and use for spray @ 250 ml per 15 liter of water.-- Field crop insect pests.
26. Application of a mixture of Green leaves of Besharam (*Ipomoea*) (1kg) + Green leaves of Sitaphal (Pumpkin)(2kg) + Paste of neem leaves and green kernels(1kg) + Paste of

Mudar (*Calotropis*) leaves (0.5 kg))+Tobacco (250 gm) +Curd (10 liter) + Cow urine (5 liter). Keep in a plastic container for 1 month. Filter and spray the solution- Field crop insect pests.

27. Dip green chilli and garlic powder (1kg) in Kerosene Oil (1 liter) for an overnight in an earthen pot. Take another pot and mix powder of green chilli (1kg) +water (2 kg). Filter and mix the extract of both pot in water (200 liter) + detergent powder (200 gram).Spray the solution-- Field crop insect pests-- All type of pod borers.
28. Spraying of Aqueous leaf extract of *Datura metel* (2%w/v) or *Lawsonia inermis* (5%w/v) is found effective to reduce the severity of Late Leaf Spot in Groundnut-- Late Leaf Spot-- up to 115 days
29. Spraying of Garlic 1 kg + Dried Tobacco Leaf 200 gm + Washing soap 200 gm → 5 liter water → 150 liter water /Acre—Paddy-- Gandhi Bug.-- Nymph and adult stage.
30. Spraying of Doob Ghas extract 10%-- Tomato-- Spotted DryVirus--20 Kg Doob Ghas + 50 Litre Water—Heat 60 degree C -1hour- sieving- Solution in 200 litre water.
31. Spraying of Water extraction of the Root of Raspberry and Canna-- Field and vegetable crops-- Longidorous Nematode-- Contains Tannin andPolyphenos chemical.
32. Spraying of 20 kg Jowar leaf or coconut leaf or *Bougainvillea* leaf or Doob (*Cynodon dactylon*.) → 50 liter water → Heat 60° C for 1 hr→ cool→ water 200 liter →Viricide-- Field and vegetable crops--- Viral diseases
33. Dry leaf powder of Senwar (*Begunia),* wild sage (*Lipia geminata*), Bael (*Ajali marmilos*), Wild basil (*Ocimum canum*) 1 : 100 part of paddy -- Paddy Storage pest
34. Spraying of Kernel extract of Karanj *(Pongamia glabra*), Mahua (*Madhca longifolia*), Bada Kulanjan (*Alpinia indica*), Castor (*Ricinus communis*) or oil and white kaner (*Nerium odorus*) root extract @ 1.5%-- Insect pest of citrus group.
35. Furrow application of Neem leaf powder @ 100 kg/ha.—Sesamum-- Hairy caterpillar—Larvae.
36. Eucalyptus effectively repels cockroaches, spread fresh, crushed leaves around your kitchen baseboards and cabinets, or soak small rags in eucalyptus oil and distribute them. You just may get cockroach relief and an air freshener all in one.
37. Boric acid was first registered in the US as an insecticide in 1948 for control of cockroaches, termites, fire ants, fleas, silverfish, and many other insects. It acts as a stomach poison affecting the insects' metabolism, and the dry powder is abrasive to the insects' exoskeleton. Boric acid is generally considered to be safe to use in household kitchens to control cockroaches and ants. Homemade ant bait can be made by dissolving 1 teaspoon powdered boric acid and 10 teaspoons sugar into 2 cups (500 ml) of water; this mixture can then be absorbed into cotton balls which are left near ant trails. This reportedly will be carried back into the ants nest, killing any ants that eat it, potentially destroying the entire colony.

10. Biological Control

Suppression of harmful pest organisms by introduction, augmentation and conservation of their natural enemies is known as biological control. Natural enemies include parasitoids, predators,

and microorganisms of pests.Recent efforts to reduce broad spectrum toxins added to the environment have brought biological insecticides into vogue. Biopesticides are certain types of pesticides derived from such natural materials as animals, plants, bacteria, and certain minerals. For example, canola oil and baking soda have pesticidal applications and are considered biopesticides. An example is the development and increase in use of *Bacillus thuringiensis*, a bacterial disease of *Lepidopterous* and some other insects. It is used as a larvicide against a wide variety of caterpillars. Because it has little effect on other organisms, it is considered more environment friendly as well as gender friendly. The toxin from *Bacillus thuringiensis* (Bt toxin) has been incorporated directly into plants through the use of genetic engineering. Other biological insecticides include products based on entomopathogenic fungi (*Metarrhizium anisopliae*), nematodes (*Steinernema feltiae*) and viruses (*Cydia pomonella* granulovirus).According to an estimate 26 billion dollars are spent on synthetic pesticides worldwide per year while only 300 million is spent on biological pesticides. Biological pesticides are far less potent over the long term. As the market for biological pesticides increases, we will also see more and more farmwomen use these biopesticides, which are ultimately better for the environment and beneficial to reduce pesticidal hazards.

Conclusion

India has achieved self sufficiency in the production of food grains, but still we are not in a position to meet the standard dietary requirement of the increasing population. Food security is important throughout all aspects of day to day living. Ensuring the production of quality foods, free from potentially harmful contaminants, is of enormous significance throughout the world. With global perspectives of environmental protection and food security, herbal pesticides are getting worldwide importance for sustainable food security. To combat the challenges of today's food, health care and nutritional security, herbal pesticides can play a greater role. Use of agro-chemicals for fertigation, pest control and food storage is causing serious health hazards and polluting the scarce natural resources. Our target should be to provide healthy and chemical free food material to 1.3 billion people of developed India by the year 2025. There is an urgent need to empower women for Gender friendly agricultural technologies. This can be achieved by Enhanced use of ICT, Development of suitable models, Gender sensitization programmes at various stakeholders level.

ISSUES AND OPPORTUNITIES IN LIVESTOCK BASED ENTERPRISES FOR FARM WOMEN

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Livestock sector in India has shown an impressive growth in the last decade especially in the dairy and commercial poultry sector. It contributes 4.1 percent of the total GDP (2012-13). The livestock sector alone contributes nearly 25.6% of Value of Output at current prices of total value of output in Agriculture, Fishing & Forestry sector. The milk production now stands at 132.43 million tonnes (2012-13) and it is an important secondary source of income for 7-million households engaged in dairying and for the 70 percent of the workforce that comprised women. The per capita availability of milk is 295 g per day in India which is higher than the world average. Poultry sector has also shown an impressive growth because of the conducive government policies for commercial poultry production and the focus on family poultry system which addresses livelihood issues. The egg production in India was 69.73 billion in 2013, while the poultry meat production was 2.68 mt. The per capita availability of egg in India is 55 eggs per year. The livestock sector has the potential to provide income and employment and nutritional security to millions of farmers which is yet to be fully tapped. The growth witnessed in the dairy and the commercial poultry sector can be spread horizontally provided it encompasses other livestock species like goats, pigs and backyard poultry which are less capital intensive but have greater impact on the health and well being of the farm families. Although the contribution of women in making the operation flood programme has been immense because they have been shouldering most of the activities related to rearing and management of dairy animals, their abilities and expertise with respect to other livestock species is yet to be fully appreciated especially in the field of small ruminants and backyard poultry.

Women are vital to food security and family well-being and their need for labour saving and income generating technologies are acute. However, until now, most technical solutions have ignored women's actual needs. Studies have shown that livestock contribute significantly to the income of poor households-particularly the income controlled by women, and enables poor and landless women to earn income using common-property resources. The expanding market for livestock products also offers an opportunity for augmenting their income to those who do not have access to land and capital resources.

The domestic animals like goats, sheep, pigs, chickens, ducks and rabbits can be reared easily by women while attending to other household activities and they are also important for household nutritional security. Identifying and supporting women's roles as livestock owners and strengthening their decision-making power and capabilities are key aspects in promoting women's economic and social empowerment. Recent review conducted by ILRI shows that if livestock technologies are developed in ways that consider the needs, interest and concerns of women and men, they can reduce women's work load, increase productivity and contribute to the generation of income.

Women play an important role in activities dealing with livestock such as care and management or transformation and marketing of certain livestock products. Furthermore, livestock ownership patterns especially for small stock and poultry appear more equitable than that of other assets like land, capital, and knowledge. These reasons have possibly contributed to an increasing inclusion in one way or another of gender aspects in livestock development projects. Gender aspects should be understood as 'practical needs' on the one hand (access to technologies, more access to better welfare) and as 'strategic needs' on the other hand (revised rules and regulations, long term improvement of women's position).

Concerning livestock development, there is a high level of agreement in the literature that socio-economic and institutional frameworks play an important role in determining who does what, and who gets what. Social and cultural norms dictate the division of labour and control over assets. Policy and institutional structures often restrict existing sources of support to women, particularly credit to acquire large ruminants. Values, norms and moral codes embedded in culture and tradition have very strong influence on gender issues as they determine attitudes and the organisational set-up of the whole community system. Like culture and traditions, political, institutional and legal structures also change slowly. Hence, these latter factors often impede the implementation of gender balanced programmes. Hence, it is important to consider the socio-economic factor while implementing livestock programmes from gender perspective. Social and cultural factors determine the possible margin of action of women and their activities. In cases where women are excluded from community meetings, have no access to education and training, and where their capacity to become actively involved is not strengthened, they will always be left behind. Economic factors are the basis for change because with a greater economic independence, self-confidence and possibilities of upward socio-economic movement increase. To achieve a broad-based impact with a particular intervention, gender aspects should be looked at simultaneously and all factors including political, institutional and cultural aspects should be considered.

Gender Issues in Livestock Production

Women and men livestock keepers typically have different needs and interests, and face different livelihood opportunities and constraints in managing livestock as well as in coping with emerging challenges such as poor access to markets, services and technical information, periodic drought, flood and disease, competing resource use, policies that favour larger-scale producers or external markets, and weak institutions (Table 1). In most system, women provide labour for various tasks related to livestock production but may or may not control the process of decision making, particularly over the disposal of animal and animal products. Similarly, women may be involved in production, but may or may not own the means of production, including livestock, land and water.

Table 1: Gender-based constraints, needs and opportunities in livestock production

Constraints	Needs	Opportunities
Low women's participation in livestock development programmes and training	• Gender sensitization for more women's participation in formal discussions • Increased access to information, use of visual aids where there are problems of literacy	• Adoption of improved technology that can suitably be integrate in traditional production system • Raise awareness of

Constraints	Needs	Opportunities
	• Include women in training and development programmes-very much open to innovations • Organise training programme in those periods and days when women are not involved in other duties • Organise training programme on-site (village) • Introduce leadership development and confidence building measures	potential of livestock in increasing household food security and household economies and promotion of gender equality. • Conduct training progarmme in villages with flexibility in schedule and venue
Time constraint in livestock management during peak labour periods	• Introduction of labour-saving technologies/devices • Introduction of skills on livestock management, e.g. full hand milking, use of locally made crates, revolving stool for milking, use of long handle rack /spade for removing dung • Look at case studies where women play a leading role in livestock production for exposure visits	• Reduce livestock mortality and morbidity • Reduction in women's work drudgery • Development of other small enterprises
Low scale of production limiting access to inputs and markets	• Introduction of group approach/ women self help group /farmers' groups or associations • Facilitation of support services at village level (AI, vaccination, deworming, credit etc.) through women self help groups • Training on capacity building of women SHGs for livestock enterprise development	• Improvements in access to inputs, technical assistance and in marketing system • Women's empowerment and increasing gender equity
Lack of common pool resource (grazing, water and forest) for livestock production and other micro-enterprises income genration	• Improve access of women's to common pool resources through community participation and management • Develop mechanism at village level for provision of water and fodder during scarcity period	• Improvement in the productivity of CPR • Enhance women's' right to control and manage CPR and livestock • Increasing livestock assets for the landless women
Informal and poor marketing system	• Improvements in infrastructure and transport services • Improving women's management and skills in value addition and processing	• Increase demand for livestock products and promote production

For successful livestock interventions the following factors have to be considered:

a) Livestock production system

The role of women in varies according to the different livestock production systems and types of animals; crop/livestock linkages; feeding; availability and quality of natural resources, ecological conditions and vitality of land and pastures; soil quality; natural water sources; other common property resources; availability and cost of inputs; use of manure and crop residues; technology used. While considering the gender roles in livestock production we should take into account the proportion of households with livestock and their social structure; ethnic, cultural and social relations; household activities and intra-household organisation; seasonal migration; relation between livestock and other activities; gender disaggregated seasonal occupation and sources of income.

In India livestock are generally raised in mixed farming systems, where animals very often have different functions. During earlier times they were a symbol of wealth and were vital for agricultural operations. Of late, with the mechanization of agriculture large the role of draft animals have diminished and cattle and buffalo are mainly reared for milk production. However, in areas where the mechanization of agriculture has not taken place, they are still an important source of draft power, dung and milk. The livestock activities are normally integrated into the existing farming systems: animals graze on fallow land and browse on hedges, utilise crop residues as feedstuffs and produce milk and meat, manure for biogas and power for traction.

Sheep and goats are generally kept on grazing only with little supplementation of the household leftovers. In most of the cases, women are the custodians of sheep and goats in the household and often children also actively take part in their management. Backyard poultry (BYP) is also an important activity for rural women as it generates cash income and provides employment opportunities while increasing the availability of meat and eggs that improve household nutrition. Studies conducted at DRWA in Odisha have revealed that BYP provides an income of Rs. 2000 per unit of 6-8 birds over a period of five months. The rural women mostly preferred Vanraja and CARI DEvendra birds for backyard poultry rearing as both the birds as well as eggs fetch high price as compared to other birds.

b) Ownership of different livestock species

Generally, men and women tend to own different animal species. In many societies, cattle and larger animals are usually owned by men, while smaller animals, such as goats and backyard poultry which are kept near the house, are more women's domain. However, ownership

system and to social and cultural factors. Ownership of larger animals is often related to ownership of the land.

c) Access to capital and knowledge

Men have easier access to government provided credit than women. Women are rarely considered creditworthy because they have no collateral. In addition, they often cannot read

husbands consent and being accompanied. In the most countries in Asia, Africa and Latin

America, animal husbandry services are mainly oriented towards men. Veterinary services and extension programmes and advisory services have been mainly designed by men for men. Extension personnel are often not trained to teach technical subjects to women or to react their specific questions. Due to limited resources in time and material, attention is first given primarily to men's animals. Extension work with women often requires special didactic knowledge and communication skills because women often speak only the local language or dialect and illiteracy is high.

d) Responsibilities and division of labour

Patterns of gender division of labour are location-specific and change over time. Although the most typical pattern of gender division of labour is that women are responsible for animals kept at the homestead, there are many variations to this pattern from non-involvement in livestock to the management and herding of large stock.

If new livestock activities are introduced, it is mainly males who decide on whether or not to participate. The intra-household division of labour then depends on household labour availability, the number and type of livestock, economic development of the household and estimated income out of the new activity. But in fact, many decisions in a family are joint decisions, although they may not be formally recognised.

In Odisha women perform all the day to day activities related to caring, feeding, cleaning, health and production of livestock. These activities performed by women may appear to involve low skill levels, they are, however, most critical to the survival, health and production of the livestock. Activities performed by men are occasional in nature, involve less time, energy and labour and largely occur in the public domain, outside the confines of the household. Activities such as vaccinations, deworming, grazing, purchase of fodder and medicines, and taking animals to the dispensary are generally taken care of by men because they involve greater mobility, access to new technology and information, greater interaction with the market and the outside world. Despite this division of work, livestock production and management continues to be a household activity with flexible arrangements of work between women and men. Women's access to information and training in modern livestock management and dairying is limited and even indirect, lowering their involvement and efficiency.

e) Role of livestock in the household nutrition

One of the major reasons for keeping livestock in the household is to get direct nutrition in terms of milk and meat, but the income derived from sale of milk, and animals are also used to buy other food items. The manures produced by keeping animals improve household food production like vegetable and other food crop production. Generally, increased livestock

members. Increased income from livestock production changes the intra-household distribution and control over products and earnings. When higher production and marketing activities become more important, women often lose their control over products and income. The level of nutrition within the family may decrease if the animals from which the products are derived are sold and the earnings spent on personal necessities, without taking into consideration the household well-being.

f) Influence marketing of livestock products in the household economy

Women tend to have greater control on the income from sale of poultry, eggs, milk and small ruminants. They tend to spend the money they earn from livestock activities on the welfare of their families. Income from livestock activities is also invested into diversification of agriculture, to buy animals and even to buy land. In many societies, the little income derived from daily milk sales is sometimes used by men for drinking.

g) Training in livestock activities

Livestock production is generally a joint activity carried out by both men and women but, compared to women, men have easier access to technology and training, mainly due to their strong position as head of the household and greater access to off-farm mobility. The decisions in activities related to livestock sector, such as breeding, handling, feeding and health care, are largely taken by men. Livestock extension services are often controlled by men and the extension personal are primarily men hence, the extension programmes and educational materials are mainly designed by and oriented towards men. Although in most societies all household members are involved in some way or another in livestock production, the decision making processes within the family and the division of labour for activities such as feeding, milking, health care, processing and marketing differs between regions, societies and

Women's access to information and training in modern livestock management and dairying continues to be limited and even indirect. Successful training should be oriented towards those household members which execute these tasks. For example, in societies where sick animals are mainly treated by women, they have knowledge of the symptoms and cures for animal diseases. But if they have no access to training, progress in best practices and appropriate herding to reduce diseases is difficult. Therefore, where extension services are dominated by men and where women have little access to training due to socio-culturally defined gender

through a carefully planned gender approach can livestock production goals and successful training of women and men be achieved.

h) Role of Self Help Groups

Targeting livestock development through SHGs can accelerate the process of learning and arranging the inputs like credit.

Gender Analysis in Livestock Production

Gender analysis requires taking into consideration factors which could influence the potential impact of a project and presents opportunities or constraints to project goals and activities. It helps in determining factors which can facilitate or constrain the project. The following factors have to be considered while making gender analysis in livestock production:

- Gender should not be an issue of mistrust and prejudice, but of creativity, inspiration and positive spirit for men and women.
- Social and cultural factors (norms and traditions which influence the behaviour of men, women and children, organisation of the daily life of the household members, specific religious rules for men and women)

- Economic factors (poverty level, inflation, infrastructure, income distribution and distribution among family members, etc.)
- Institutional structure (government, extension, education, health care, funding agencies etc., and their gender approach in theory and practice)
- Environmental factors (quantity, quality and availability of land by households and intra-household distribution, water, energy, etc.)
- Political factors (power relationship, system of decision making, legal system, etc., and their influence on the relationship of men and women)
- Demographic factors (migration, life expectancy, infant mortality, etc.)
- Legal parameters (right to ownership, law of succession, etc.)

Conclusion

Sustainable development in agriculture can only be achieved through optimum utilization of natural resources. Livestock development interventions must take into consideration the land and livestock ownership pattern. Client-oriented participatory research is needed in developing appropriate livestock technologies for women in order to identify production constraints and to develop techniques that reduce women's workloads while at the same time increasing their productivity. Such research should take into account women's roles and responsibilities, as well as their workload. The following issues should be considered in designing appropriate technologies for livestock production: (i) their implications for women's labour requirements and workloads; (ii) their suitability in terms of consumption preferences; (iii) their implications in terms of women's control over the means of production; (iv) their expansion and use of women's indigenous knowledge; (v) the participation of women in their trials; and (vi) the importance of incorporating women's physical, social and cultural assets when designing research activities.

Participation of women is essential for developing and promoting technical interventions. Women's self help groups should be encouraged to take up activities related to livestock production. This is often the only way for poor women to obtain sufficient resources (material, capital and labour) to initiate livelihood activities. The experiences suggest that there is need to focus equally on technology development and the enabling factors (availability and access to markets, credit, labour), which allows women to adopt new interventions. Providing support either in the form of funding or stock animals are good tools in starting the livelihood programme for vulnerable women, as it facilitate more effective utilization of unpaid family labour, more stable households and increased self-reliance. A favourable policy environment in terms of access to and control of productive and natural resources such as land, livestock, micro-credit, veterinary services and assured markets will have to be provided and socio-economic and technical constraints needs to be addressed in order to strengthen women's influence and social empowerment

ENTREPRENEURIAL OPPORTUNITIES FOR WOMEN IN HORTICULTURE

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Horticultural crops play a unique role in India's economy by improving the income of the rural people. Cultivation of these crops is labour intensive and as such they generate lot of employment opportunities for the rural population. Fruits and vegetables are also rich source of vitamins, minerals, proteins, carbohydrates etc. which are essential in human nutrition. Hence, these are referred to as protective foods and assumed great importance as nutritional security of the people. The earlier seasonal availability of production has now extended to all the year round, increasing per capita consumption of fruits from 40 to 85 g and of vegetables from 96 to 175 g. It has also played a significant role in the women empowerment, providing employment opportunities and income through mushroom cultivation, floriculture, processing, value addition, nursery raising, vegetable seed production etc. Horticulture has emerged as an indispensable part of agriculture, offering a wide range of choices to the farmers for crop diversification. It also provides ample opportunities for sustaining large number of agro-industries which generate substantial employment opportunities.

The horticulture sector contributes about 24.5% of the GDP from about 8% of the area. Contribution of women in agriculture in general and in horticulture in particular is higher. In vegetable production involvement of women is more than 90 percent. Various activities like mixture preparation, filling of polybags, planting of seedlings in polybags, sowing of seeds, watering, transplanting, manuring, harvesting, grading, processing and marketing are perform by women. Despite of lots of involvement in various activities, women are still ignored and need visibility. Horticultural enterprises are one of the technological options suitable for women like nursery raising, vegetable growing, mushroom cultivation, protective cultivation of high value crops, floriculture, beekeeping etc, which offer better opportunity for women to take these activities as a venture with skill and dedication so that they become empower. Rural women in India face several constrained that come in the way of their economic development. Women have fewer opportunities than men due to a number of gender biases within their societies, including unequal opportunities for access to education, employment, and asset ownership. Without education, women enter a vicious circle marked by fewer opportunities for employment. Over 90% of the rural women workers are unskilled; 90% work in the informal/unorganized sectors. The wage rates for women in agriculture are 30-50% less than those for men, and female casual laborers have the highest incidences of poverty of any occupational category, male or female. Evidence is growing that gender-sensitive development strategies contribute significantly to income creation as well as to equity objectives. Therefore, differences between men and women's needs and constraints should be identified through analysis, planning, implementation, and monitoring of development programs. More gender balance in enterprise development also means a more fair distribution of employment and income between women and men.

Horticultural Enterprises

Nursery raising, mushroom production, vegetable farming, seed production, floriculture, interior plant decoration, cultivation of medicinal and aromatic plants, organic farming, value addition of fruits and vegetables, packaging, bee- keeping etc.

Nursery raising technology/ quality planting material production technology

Most of the horticultural crops are raised in nurseries and then transplanted in the field. It is well recognized that due to seed rot and seedling mortality, substantial plant population are lost, which affects their further production. Thus, the health of crops in nurseries is of immense useful for profitable and substantial production of vegetables through the production of healthy seedlings. The demand for high – quality planting material is steadily inversing due to interest in vegetable production. Demand from homestead gardens has also been growing in urban areas. In order to meet this demand, there is ample scope for introduction of small rural/ urban nursery, which will serve to augment the income of women while also boosting quality and productivity in the horticulture sector. The nursery raising is highly remunerative and can be raised in small place with minimum affords making it highly suitable for adoption by small/ marginal women. A space of 1 sq.mt. can easily accommodate about 200 saplings (10x 12 cm polybag size) in plastic bags. However, in case of cucurbits vegetable, an average selling price of about Rs. 10 fetches a gross annual income of Rs.2000 per sq.mt. Besides this, village women can undertake nursery raising in their spare time by using very little space and inputs. The tropical fruit industry is facing with two major problems: low productivity and post harvest losses. Low yield is mainly due to poor planting materials and no availability of recommended propagation technique. After receiving training women can able to produce quality planting materials of horticultural crops by different propagation techniques like grafting, cutting, budding, layering etc. and earn the money by selling it in the market. The demand of quality planting materials is very high.

Interior plant decoration

Interior plant decoration is also getting momentum due to change in the life styles. Women particularly can earn a income by doing interior designing through ornamental (pansies, wax begonia, lobelia, fuschia coleus), flowering (Orchids, African Violet, Piece lily, marigold, impatiens, begonia caladium) and indoor plants (dracaena, philodendron, bromeliad, palms, sansevieria, Chinese Evergreen) not only in various parties but also in various offices, hotels, hospitals etc.

Mushroom production

Now days mushroom is becoming much popular in our country, have a good scope for domestic as well as export. About a decade ago, the government promoted the mushroom cultivation protein mal nutrition, generating employment and supplementing the income of the weaker sections and earning foreign exchange. As production of mushrooms requires a small area and waste materials from different crop residues can be used, so it is very cheap to produce these highly nutritive alternatives of the meat. It does not require a highly skilled supervisory staff even house wives can handle a unit easily. So, rural people can be supported by educating and training them in mushroom production technology. Delhi the largest consumer is also the biggest trade centre for mushrooms. Ghaziabad, Meerut, Gurgaon and Sonipat become important mushroom production areas. In Uttar Pradesh, Nainital and

Dehradun districts are the important producers of mushrooms. Many commercial units are being set- up in western Uttar Pradesh, in general, and the Kumaon in particular. A fully export oriented unit in Dehradun is producing more than 1000 t a year. Apart from the units at Allahabad, Kanpur, Saharanpur and Meerut, mushroom production is popularized, especially oyster mushroom. The Madhya Pradesh Agro- industries Corporation popularized mushroom cultivation in the tribal areas of Chhattisgarh by supplying spawned compost to the prospective growers. Cultivation of paddy straw mushroom is popular in Bhubaneswar. Entrepreneurs and growers from Tamil Nadu, Karnataka, Kerala, Andhra Pradesh and Maharastra have recently taken up large scale mushroom cultivation. Various women shelf help groups in north east region are involved in mushroom production activities. Many Krishi Vigyan Kendra (KVK,s) and NGO,s are working, encouraging women farmers for mushroom production and giving trainings on this aspect.

Protected cultivation of vegetables

Vegetables play an important role in nutritional security and fit into the intensive cropping system to make it more remunerative. Presently India produces about 146.55 million tonnes of vegetables from an area of 8.5 million hectares with an average productivity of 17.2 t/ha. Though there has been phenomenal increase in area (2.99 folds), production (8.88 folds) and productivity (2.96 folds) of vegetables in our country during the last 6 decades, still there is huge gap between present production and future requirements this necessitates high vegetable production and wide availability. Production of vegetables under protected condition is the best alternative to reduce this gap and use the land and other resources more efficiently. By adapting protected cultivation, year round availability of quality produce for both domestic use and export can be assured. Cultivation of high value vegetables under protected conditions in India is gaining more importance. Presently the area under vegetable production in protected conditions is 5000 ha., while the national potential is one lakh ha. Insect pest and diseases are major constraints to vegetable production under protected conditions. During winters in north Indian plains and hills, the temperature and solar radiations are sub- optimal for growing off season vegetables such as tomato, capsicum, brinjal, cucurbits, okra, cowpea, amaranth and chilli. In tomato, low temperature cause puffiness and blotchy ripening. Hence, during extreme condition of winter season these vegetables can be well cultivated under polyhouse. In a medium- cost greenhouse, an yield of tomato and capsicum may be taken @ 98.6- 110.5 tonnes/ha and 87.2 tonnes/ ha respectively. Women can grow the high- priced vegetables- asparagus, leek, tomato, cucumber and capsicum during winter season and get good profit. Now it is possible to produce cucumber (parthanocarpy) and capsicum etc year the round (three crops in a year) in polyhouse with good yield and sound profit which is not possible in open condition due to biotic and a biotic factors. The demand of high value vegetables are very high in the domestic and export.

Seed production of vegetables

Seed production of vegetables is an important activity as it's provide income and employment opportunities for resource poor especially for women. Seed production in vegetable is the limiting factor for cultivation of vegetable in India. The vegetables require specific temperature and other climatic conditions for flowering and fruit setting. Some vegetables are grown in one part of the country but their seed production is restricted to another part. To reduce such micro climatic condition a protective environment is essential. Summer squash requires a mild climate

for flowering, fruit setting and fruit development and seed formation. Therefore, its seed production is only restricted to hilly region of north India in summer season. But nowadays seed production of summer squash 'Australian Green and Pusa Alankar' is also feasible in north Indian plains in a low and medium cost of greenhouse. Similarly, seed production of highly remunerative crops- tomato, capsicum and cucumber- is also performed under protected environment. The maintenance of purity of different varieties can be achieved by growing them under greenhouse without giving isolation distance particularly in cross pollinated vegetables- onion, cauliflower and cabbage To get proper pollination and fruit set in onion, cucumber and bittergourd, the bee- hives are kept in side during flowering. Protected cultivation has not only extended the growing season of vegetables and their availability but also encouraged conservation of different rare vegetables. Since, open pollinated tomato, brinjal and chilli seeds is easy to produce at home level. Women can take this activity as an enterprise and start either individually or in groups for higher production and income.

Raising off season nurseries

The cucurbits are warm season crops. They are sown I last week of February or in last week of March when night temperature is around 18-20^{0}C. But in polyhouse their seedlings can be raised during December and January in polythene bags protected from cold winds and frost. By planting these seedlings during January end or first week of February, their yield could be taken in one and one- and – a – half months in advance than the normal method of direct sowing. This technology fetches the bonus price due to marketing of produce in the off- season. So women can start raising off season nursery technology as a enterprise and earn sound profit.

Floriculture

Flowers are symbol of beauty, love and tranquility. In our country, flowers are sanctified and are commonly used for worship of God and for various decorative purposes. It is well known that flower cultivation, an ancient farm activity with great potential for generating remunerative self- employment among small and marginal farmers besides earning foreign exchange. On all festive occasions like, in marriages, religious ceremonies and social functions, the use of flower bouquet and garlands has been almost essential. Therefore there is a high demand for cut and loose flowers in the market. Women can grow these flowers for loose as well as for cut flowers purpose. The demand of flowers both loose and cut is very high at various occasions. Participation of women in different activities in floriculture like nursery raising, planting, weeding, picking, garland and *gajra* making and marketing of plants is high. So it is good and profitable venture for women**.** The farm women of Self Help Groups can utilize their common land for commercial cultivation of flowers to improve their socio-economic status. To get maximum production from cultivation of flowers, women need to develop skill in this area through proper training.

India with her diverse agro climatic condition offers a bright prospect for the cultivation of a wide spectrum of flowers. More than 88000 ha of land are estimated to be under flowers in India Of the total area, two- third area is devoted to production of traditional flowers like marigold, jasmine, roses, chrysanthemum, tuberose etc the rest flowers such as rose, gladiolus, carnation, tuberose and orchids used in bouquets and arrangements. Tamil Nadu, Karnataka, West Bengal, Andhra Pradesh, Rajasthan, Maharastra, Uttar Pradesh, Delhi and Haryana are the major flower growing states.

Table 1. Anticipated income from marigold cultivation (per acre)

Sl. No.	Particulars	Expenditure (Rs)
1.	Land preparation : 2 ploughing	5000
2.	Seeds- 800 g	100
3.	FYM- 20 t	10000
4.	Fertilizes	5000
5.	Plant protection measures	4000
6.	Labour charges	10000
7.	Total	34100
8	Interest on establishment cost @ 12.5 percent	4300
9.	Grant total	38400
10.	Yield 7 t @ 10/kg	70000
11.	Net profit	31600

Value addition

India is leading in production of various horticultural crops but the post harvest losses are very high. About 22- 40 % of the fruits and vegetables amounting to more than Rs. 3000 crores is lost every year in the country due to poor harvest infrastructure. Considering the minimum per capita requirement of fruits and vegetables as 120 and 280 g/day, it has been estimated that there is a short fall of about 9 million tonnes of fruits and 41 million tonnes of vegetables per year for the country. It is the need of the hour to check these losses to feed the ever growing population. The fruit and vegetable processing industry in India is still in its infancy and only around 1-2 % of its total production is processed as compared to 70 % in Brazil and USA, 78% in Philippines, 80% in South Africa, 83% in Malaysia and 30 % in Thailand. Thus, a great scope exists in expanding the food processing sector, which will in turn also help employment generation and better returns. A list of value added products from different fruits and vegetables is given below.

Table 2. Value added products from fruits and vegetables

Products	Fruits/ vegetables
Sauce	Banana, papaya, plum, tomato
Squash	Mango, orange , pineapple, lemon , bael, lime, litchi
Nectar	Mango, bael, jamun
Jam	Mango, apple, papaya, pineapple, cashew apple, sapota, karonda , carrot
Jelly	Guava, sour apple ,plum, karonda, pineapple , wood apple
Marmalade	Citrus

Products	Fruits/ vegetables
Candy	Citrus peel, karonda, petha, ginger
Juice	Mango, litchi, lemon, pineapple, cashew apple, tomato, bitter gourd, bottle gourd
Sun dried products used as vegetables	Wild beans and fruits
Curry powders	Pomegranate seed (wild type)
Juice, syrup, candy	Cashew apple
Tuti- fruiti	Water melon rind, raw papaya (papain extracted)
Beverages	Cucumber, pumpkin, watermelon seed kernels
Sweets (Burfy)	Bottle gourd (matured)
Pickle	Mango, aonla, jack fruit, carrot, radish, cauliflower, chilli, ginger, karonda
Salted ginger, vinegar	Ginger
Chips	Banana, potato, bitter gourd
Syrup, canned fruit	Cashew apple
Coconut oil, coconut cheese	Coconut

Packaging

Packaging technique is very much suitable for women. With little effort and skill women can start it. At initial stage packaging business require investment but give more profit. By packaging we can enhance shelf life of produce and increase availability of produce through out the year. Packing forms an integrated part of marketing of fresh horticultural produce. It provides the essential link between producer and consumers. Various types of packaging materials are used in bamboo baskets, gunny bags and wooden boxes. Use of plastic crates in packaging of horticultural crops helps minimize the cost of packaging materials and makes the whole process less dependent on scarce items like woods etc., thereby resulting in conservation of environment. A ventilated corrugated fibre board (CFB) box has been developed with ventilated partition for packaging and transportation of mangos. This box has been successfully modified for export of kinnow on behalf of NAFED. Cotton stick waste packed with Nagpur mandarins from Nagpur to Delhi gave very encouraging results. It has been experimentally established that fresh button mushroom can be packed and marketed in trays/ plates made of leaf or other plant parts like arecanut sheathes covered with shrink wrapping film.

Bee - keeping

Dissemination of beekeeping technology through lead farmwoman Ms Gian Kaur of village Makha in district Mansa, Punjab, adopted scientific beekeeping through the concerted guidance of KVK, Bhatinda. After getting 1 week's training in bee keeping, the KVK helped her in getting loan of Rs 54,000 from Mansa Co-operative Development Bank to start the enterprise. She

started with 12 bee colonies and added subsequently another 15 colonies within 1 month, which increased to 54 in a year. Though her main interest was sale of honeybees by bee breeding rather than sale of honey, she sold 1 q of honey in 5 months. She had also sold 49 framers with honeybees till March 2004. The strength of her apiary rose to 90 by September 2004. The economics of bee keeping by Ms Gian Kaur is given below:

Table 3. Economics of beekeeping

Sl. No	Details of expenditure:	Amount (Rs.)
(i)	Cost of 27 bee colonies (@ Rs 800/unit)	Rs 21,600
(ii)	(ii) Cost of bee accessories (bee veil, gloves, hive tool, smoker, queen cage	Rs 1,000
(iii)	(iii) Cost of artificial diet (40 kg sugar @ Rs 16/kg)	Rs 640
(iv)	Cost incurred for raising the strength of bee colonies to 90: Cost of 30 kg foundation sheets of wax	Rs 9,000
(v)	Cost of 60 wooden boxes	Rs 24,000
(vi)	Miscellaneous expenditure	Rs 500
	Total	**Rs 56,740**
Details of income		
(i)	Sale of 100 kg of honey	Rs 10,000
(ii)	Sale of 94 frames with honeybees	Rs 37,600
(iii)	Sale of 60 bee colonies	Rs.1,20,000
(iv)	Gross Income	Rs 1,67,600
(v)	Net profit	Rs 1,10,860
(vi)	Profit/colony/year	Rs 2,771

Conclusion

No doubt, horticultural enterprises are more laborious, need utmost care and highly remunerative. They are regular sources of income and allows better opportunity to utilization of own resources and create employment generation. Some of the horticultural enterprises like nursery raising, organic farming, mushroom cultivation, bee keeping, value addition, cultivation of medicinal plants etc. require low initial investment. The small and marginal farmers who have with limited capital can take up these enterprises in the initial stages and those having better resources may go for other enterprises like hi- tech nursery, protected cultivation, seed production of vegetables, spawn production, packaging etc., for enhancing their income and status.

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OCCUPATIONAL HEALTH HAZARDS, DRUDGERY OF FARM WOMEN AND MITIGATION METHODS

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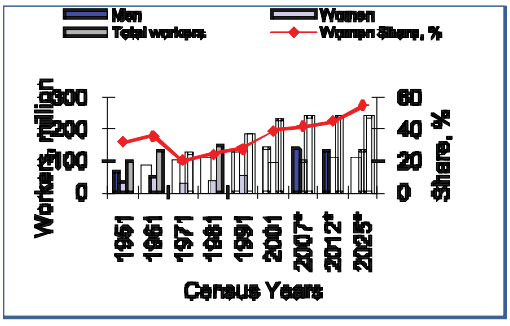
It is said that health is wealth. Every person has right to live with a good physical and mental health. Any occupation that creates any health problem that should be taken care so that occupational health hazard will be mitigated. Agricultural occupation impacts small physical health problem for a long time, which leads to an incurable disease. Occupational hazard is something that causes harm to the working man, machine or the environment. The health hazard concerns to the hazard to the working man. Source or situation with a potential for harm in terms of injury or ill health, damage to property, damage to the workplace environment or combination of these.

In India contribution of women in agriculture is about 42%. Women as farmers, agricultural workers and entrepreneurs, form the backbone of agricultural rural economy in the developing regions and yet, together with children, they remain one of the most vulnerable groups. These activities are drudgery prone. Though a number of farm- tools and implements have been designed and developed by research organizations and state agriculture universities but suit to male subjects. Moreover, several farm activities traditionally carried out by men are also being performed by women, as men are pulled away into higher paying employment. Thus; rural India is witnessing a process towards increasing level of feminization in agriculture. Recently the role of women in agriculture is increasingly being understood, recognized and addressed trough research, extension, policies and programmes during the past three decades. In agricultural operations like transplanting, harvesting, post harvest management and packaging are mostly done by the farm women. These activities are drudgery prone. When we think to reduce the drudgery, first we have to empower them. 'Empowerment means moving from a position of enforced powerlessness to one of power'. In this process, women should be empowered socially, economically, educationally and politically that can help them take self-decision regarding education, mobility, economic independency, political participation, public speaking and awareness to exercise rights.

The rural woman plays an important role in agriculture and allied sectors. Their involvement in agriculture sector is increasing day by day. As per the census data for the year 2012 the women share was 55% which is projected to be 65% by the year 2025.



Participation of farmwomen in different farm operations

Farmwomen are involved in the field of agriculture, food security, horticulture, processing, nutrition, sericulture, fisheries, and other allied sectors. The farmwomen's participation in hilly states and Central India, i.e., Madhya Pradesh for various farm activities are shown in Table 1. The comparable data showed significantly more involvement of farmwomen in hill agriculture as compared to plain.

Table 1. Participation of farm women in different farm operations.

Activity	Participation of farmwomen in different farm operations					
	Hill states*				Central India (MP)**	
	Himachal		Uttarakhand			
	Mean	SD	Mean	SD	Mean	SD
Land preparation	91.5	6.1	96.7	2.5	51.7	5.4
Fertilizer application	95.0	4.0	96.1	2.2	41.1	5.9
Seed selection	94.5	4.4	96.6	2.5	-	-
Seed treatment	94.2	4.6	90.7	15.1	44.8	6.8
Nursery raising	91.4	5.9	96.5	2.4	-	-
Sowing	91.2	6.2	96.5	2.4	67.6	4.7
Transplanting	91.4	5.9	96.0	2.0		
Irrigation management	92.4	4.0	95.5	1.8	31.5	7
Weeding	92.6	5.0	95.4	1.9	76.4	5.4
Plant protection	89.2	6.1	95.8	2.1	18.1	3.1
Harvesting	87.6	4.4	95.9	2.1	72.5	5.5
Carrying crops	-	-	-	-	56.0	7.0
Threshing	-	-	-	-	47.8	4.9
Winnowing	-	-	-	-	39.9	4.7
Grain carrying	-	-	-	-	52.8	5.8
Cleaning & grading grain	-	-	-	-	54.2	5.3

*** Anon., 2003, ** Singh et al, 2006 b**

Drudgery is generally conceived as physical and mental strain, agony, fatigue, monotony and hardship experienced by human being, while all these result in decline in performance of men and women alike. The plight of women in this regard is alarming as they are constrained by illiteracy, poor health, unemployment, low technical know-how and skills. The farmwomen put in hard physical labour beyond their capacity. There are some other causes for which the agricultural operation is still known as the most hazardous industry in the society. These are

i. Seasonal nature of agricultural activities irrespective of summer, rain or winter
ii. Traditional methods of work which is time consuming and laborious
iii. Increase in mechanization without technical knowledge
iv. Increasing use of pesticides and agro-chemicals irrespective of requirement
v. Use of non-ergonomic tools and equipment which increases drudgery of work
vi. Lack of education and information of farm workers on the health hazards

So many accidents are happening in day to day work of agricultural sector. Some collected data of selected states during 2004-05 and 2005-06 is listed below in the Table 2. This table shows accident in agricultural sector is mostly due to use of farm machinery and tools. So proper use of farm machinery tools with adequate technical knowledge, occupational health hazard in agriculture can be mitigated.

Table 2. Agricultural accidents data for 2004-05 and 2005-06 for some selected states

State	No. of accidents reported			Accidents incidence rate/ 100000 workers/yr	Fatality rate/10 0000 workers /yr
	Farm Machinery & Hand Tools	Others	Total		
Tamilnadu	265 (46.2%)	308 (53.7%)	573 (100%)	245	10.0
Odisha	412 (83.3%)	104 (16.7%)	516 (100%)	1520	17.7
Madhya Pradesh	120 (63.5%)	69 (36.5%)	189 (100%)	294	18.7
Punjab	32 (78.0%)	9 (22.0%)	41 (100%)	66	12.8
Rajasthan	218 (48.1%)	235 (51.8%)	453 (100%)	373	42.8
Arunachal Pradesh	61 (71.8%)	24 (28.2%)	85 (100%)	558	6.5
West Bengal	352 (79.1%)	93 (20.9%)	445 (100%)	294	15.2
Total/ Weighted Mean	1460 (63.4%)	842 (36.6%)	2302 (100%)	334	18.3

Types of Occupational health hazards in agricultural sector

i. **Mechanical hazards:** Poorly designed and/or guarded agricultural machinery is a major cause of fatalities and accidents. Injuries from cutting tools are another major risk.

ii. **Psycho-social hazards:** Low pay, sexual and other harassment, job insecurity, poor promotion mechanisms, delay in payment of salaries.

iii. **Work organisation hazards:** Badly organised shift work and working hours, excessive overtime, lone working, lack of control over work.

iv. **Ergonomic hazards:** These hazards can cause permanent injuries and disablement. For example: badly designed machinery, prolonged static working positions, repetitive work, unsuitable tools used by workers, poor seating

v. **Biological**: Workers may be exposed to infections and parasitic agents at the workplace. Persons working with animal products and agricultural workers are likely to be exposed to biological hazards.

vi. **Chemical**: Toxic corrosive, allergenic and carcinogenic chemicals act by local action, inhalation and ingestion on exposure to concentrations beyond the threshold limit value (TLV).

Reasons for agricultural hazards

i. Unskilled operator.
ii. Lack of Technical Knowledge.
iii. High speeds that render them unstable.
iv. Improper hitching of trailer/ farm implements.
v. Overloading during transportation of goods.
vi. Transportation of live load by tractor.
vii. Shutting down the engine on down slopes.
viii. Rotating parts without safety covers/guards.
ix. Lack of proper training/orientation.
x. Improper clothing of workers.
xi. Non wearing protective clothing.
xii. Dusty environment.

Mitigation methods of occupational health hazards

i. **Elimination of hazardous material**: If we can do a farm operation avoiding a hazardous material, then that is the best way to control the occupational hazard.

ii. **Substitution of hazardous material:** Utilization of organic/bio pesticide rather than use of a chemical pesticide. This control measure minimizes environment pollution as well as eliminates health problems associated with chemical pesticides.

iii. **Engineering controls of hazards:** Engineering controls are physical changes to the work area or process that effectively minimize a worker's exposure to hazards.

a. Enclosed Hazard: Rotating parts may be covered by safety guard.
b. Isolate Hazard: Isolation of the hazard with interlocks, machine guarding, welding curtains and other mechanisms.
c. Remove / Redirect Hazard: Removal or redirection of the hazard such as with local and exhaust ventilation.
d. Redesign Workplace: Redesign of workstation to minimize ergonomic injuries.

iv. **Administrative controls of hazards:** If engineering controls are not feasible then consider implementing administrative controls. Examples of administrative controls include:

a. Limited time exposure to hazards like high vibration, sound or dust exposure
b. Written operating procedures
c. Safety and health rules for employees
d. Alarms, signs and warnings
e. Buddy/ partner system
f. Training to the operators

v. **Personal Protective Equipment to avoid hazards:** If all the measures for mitigation of occupational health hazard fail then we will go for intensive care of the operator by the use of apron, goggles, mask, shoe, helmet/cap etc which are known as personal protective equipment to avoid hazards.

Effective hazard control is by the application of all the three measures i.e; engineering, administrative and use of personal protective equipment.

Preventive Maintenance

A breakdown of equipment in the workplace may cause a severe hazard. So the equipment should be maintained regularly in a regular interval. A particular interval for maintenance of all equipment should be determined. A written preventive maintenance program should be implemented, so that everyone will follow the procedure and action can be taken against the faulty workers. Audit against safety of a machine also should be conducted by an external agency.

Manage Change

A management of change program ensures that any modifications or additions to equipment or processes are understood and controlled. The entire working employee should be updated about the changes of the relevant equipment drawings. The safety procedures of the equipment or process should be modified as per the change. Training for employees should be conducted on the changes of the equipment or process.

Occupational Health Program

An occupational health program allows to respond effectively to workplace injuries and illnesses and to monitor potential health problems. Medical services & first aid should be available at the workplace for emergency use. A medical screening should be conducted for all employees, so that a person suffering from asthma will not be recruited in a industry which continuously produces dust. It is beneficial for the employee as well as for the employer. The employer should keep the medical records of all the employees and it should be regularly maintained. The employer should conduct some wellness program with the help of health centers or NGOs for the benefit of the employee.

Emergency Planning

Effective planning for emergencies is another mechanism of controlling hazards and avoiding employee injuries. A standard written emergency plan should have with all the industries or employers and that should be followed. An emergency eyewash and safety showers should be

installed where there is a chance of contamination of chemicals. Emergency drills should be conducted with the help of local emergency responders like fire extinguish centre, natural disaster management centre or any NGOs working on these etc. Emergency contacts of the local emergency responders should be written in display board in several places for the knowledge of the employee and these should be regularly updated.

Suggestions

Following suggestions can be given for the mitigation of occupational health hazard for the farm women:

1. Due attention is needed with regard to suitability of already developed equipment for various farm operations to farmwomen too.
2. Farmwomen traditionally and comfortably involved in the farm operation need not to be replaced by introduction of implements.
3. Indian anthropometric data may be utilized for refining/modifying/developing the farm implements.
4. Manually operated improved farm tools and implements suitable for farmwomen need to be popularized in the region for increasing productivity of farmwomen.
5. Women friendly improved farm tools and implements have potential to increase the working efficiency of farmwomen with reduced drudgery.
6. There is also need to focus on power-operated implements using ergonomical considerations to provide more options available with farmwomen

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OPPORTUNITIES IN FISHERIES BASED ENTERPRISES FOR WOMEN IN WATERSHEDS

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Introduction

Watershed is an entire region draining into a river, river system, or other body of water. Watershed management (WSM) is the integrated use and/or management of land, vegetation, and water in a geographically discrete drainage area for the benefit of its residents, with the objective of protecting or conserving the hydrologic services that the watershed provides and of reducing or avoiding negative downstream or groundwater impacts. Watershed development has become the main intervention for fishery resource management and rural development. Fisheries sector contributes greatly to the livelihoods and food security of people besides to recreational benefits and ecosystem services. India with its fishery resources of 8129km of coast line, 1.97 lakh km of rivers and canals, 3.15 million ha of reservoirs, 2.35 million ha of ponds and tanks, 1.3 million ha of oxbow lakes and derelict waters, 1.24 million ha of brackish waters and 0.29 million ha of estuaries stands 2nd in global aquaculture production. Almost 11-fold increase in fish production from mere 0.75 mt produced during 1950-51 to 8.3 mt (4 mt capture and 4.3 mt culture) during 2011-12 with the annual growth rate of 4.5% has been achieved in India (Ayyappan, 2012).The fisheries sector has been recognised as a powerful income and employment generator as it stimulates growth of a number of subsidiary industries and is a source of cheap and nutritious food, at the same time it is an instrument of livelihood for a large section of economically backward population of the country.

Odisha is having 6.72 lakh ha of fresh water resources, 480Km of coast line and 4.18 lakh ha of Brackish water resources for development of fisheries sector. Out of a total fish production of 4.1 lakh tonnes during 2012-13, the production from freshwater was 2.62 lakh tonnes (Directorate of fisheries, Govt. of Odisha). About 80% of the state population are fish eaters. The annual per capita fish consumption is 9.31 Kg. (Annual Activity Report 2013-14, Department of Fisheries and animal resources development). . Nonetheless, present fish production stands far behind the target or demand of 16 mt of fish to be met from culture (10 mt) and capture (6 mt) by the year 2025 in India.

Opportunities for Women in Aquaculture

Women's participation in aquaculture and fisheries is pronounced in many of the Asian countries. In Vietnam, women were found to be very active collaborators in various aquaculture activities including post stocking activities. In Combodian small scale aquaculture women have been found to contribute more than men in all activities like pond digging, preparation of pond, seed procurement, fertilization and feeding. The role of Indian women in aquaculture is relatively low when compared to many other Asian countries. Here, women have to limit their activities to subsistence aquaculture. The low level of participation is due to age old social,

cultural and ideological barriers imposed on them. While men are actively engaged in the activities like pond preparation and repairing of hedges, production, maintenance and management of feed are usually done by women. There exists considerable scope for active participation of women. Several factors that weigh positively for women are ready availability of different low cost production technologies of varying production range, compact production area requiring very little mobility on part of women, proximity of these ponds to their houses etc.

The aquaculture technologies like fry production, composite fish culture, culture of small indigenous species of fishes and integrated fish farming can be adopted by women to make use of the watershed ponds. Fry production is found to be a good proposition for farm women as the demand for good quality seed is always high. It has the added advantage that considerable income could be earned within a short period of 2-3 months of culture. Inability of women to procure fry from long distance, inconvenience in transporting large numbers of fry over long distance, high mortality of fry during transportation, high cost of transportation and packing, unavailability of fry of desired species at the right time are some of the constraints faced by the rural women for venturing into aquaculture.

Across many Asian countries women have proved their efficiency in managing composite carp culture. The mjor steps in grow out carp culture are fertilisation of pond, stocking of fish seed, supplementary feeding, soil and water quality management and harvesting. With migration of men to the cities, the responsibility of fish farm management generally rests on the shoulder of women. In Thailand, women are involved in various aquaculture activities, including purchase of fingerlings. Marketing is solely a women dominated actively, while men are responsible for harvesting of fish. Feeding and maintenance of ponds are the activities carried out with the participation of both men and women. In a survey conducted in Combodia, it was indicated that women contributed to 31 % of total aquaculture activity, whereas 55% of the work was carried out by men and 14% by children. Women were found to actively participate in feeding and marketing of fish. Nandeesha (2004) reported that following the success of small-scale aquaculture, women are engaged actively in seed production of common carp, Nile tilapia and silver barb.

Integrated Fish Farming (IFF) is a sustainable-agriculture technology practiced widely in Asia and other regions of the world. The farming subsystems, e.g., fish, crop and livestock are linked to each other in such a way that the byproducts/wastes from one sub-system become valuable inputs to another sub-system, thus ensuring total utilization of land and water resources of the farm. Although requiring low levels of inputs, both financial and labour, it has considerable potential to provide food security, nutritional benefits, employment generation and in providing additional income to resource poor small farmers. Simultaneous production of fish in ponds and livestock and poultry production over or beside the ponds constitute a continuous organic fertilization of the pond by the livestock. DRWA has also taken steps to popularise the integrated fish farming techniques by giving priority to farmer's choice and resource availability. The continued sale of eggs and meat through integrated fish- duck and fish poultty farming, decreased the economic burden of their family and ensured their nutritional security. They could achieve an economic gain of Rs 1,15,000/- and Rs 73,685/- from fish cum duck and fish cum poultry integration respectively. (Sahoo et al, 2010). Other integration with vegetables and mushroom showed great promise. Through mushroom cultivation each women farmer could

gain Rs 175/- per 2 weeks. Small indigenous freshwater fish species (SIF) are defined as fishes which grow to the size of 25-30 cm in mature or adult stage of their life cycle. They inhabit rivers and tributaries, floodplains, ponds and tanks, lakes,beels, streams, lowland areas, wetlands and paddy fields. Integration of SIF in aquaculture has proved to increase the aquaculture production in Bangladesh. The culture of SIF's either singly or as a candidate species in polyculture along with IMC in the backyard ponds will be serve as a source of sustained source income and nutrition to rural women and the pathway to child nutrition is through women empowerment.

Opportunities for Women in Post Harvest Fisheries

Women's most prominent role in small-scale and industrial fisheries is in post-harvest, processing and marketing. 20% of the fish catch processed using traditional methods like salting and drying is done mostly by women in coastal areas of India. The most practical way to increase profitability in fish processing is by value addition. Value addition is any additional activity that in one way or another changes the nature of a product thus adding to its value at the time of sale. With the globalisation and urbanization, the demand for value added fish products is continuously on the rise. Increasing number of working women, reasonably good expendable income, increased emphasis on leisure pursuits, good educational status, overall pressure on time, popularity of microwave oven, health benefits associated with fish are some of the factors which favours the demand for value added products

The different post harvest processing or value addition activities that could be adopted for the economic empowerment of rural women are:-

- Sale of fresh fish and fresh fish products: The sale of dressed freshly captured fish is an alluring business as it has great demand among the urban consumers.
- Preparation and sale of cured fish products: The curing of fish in a hygienic manner, ie. In raised platforms, solar or mechanical dryers will definitely improve the quality and shelf of the product that has the potential to attract consumers.
- Preparation and sale of coated fish products: The demand for coated fish products like Fish cutlets, burgers, balls etc are increasing with the increasing number of fast food outlets and bakeries.
- Preparation and sale of fish by products like fish meal and silage that finds application as feed ingredient and fertilizer.

Thus watershed development programmes can not only protect and conserve the environment, but can also contribute to livelihood security. Women's participation as equal and productive partners in the fisheries and aquaculture sector has significant impacts on households' nutrition and living standards. However, to achieve that, immediate attention need to be paid for creating policies that ensures the reduction in gender discrimination and providing better access to technology, resources and market.

POLICIES AND PROGRAMMES FOR WOMEN EMPOWERMENT

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Introduction

A document of U.N.O. (1982) "The voice of the working woman" makes a significant statistical statement- "Women make up 50% of the world's population, comprise 33.3% of the official labour force, perform nearly 66.6% of all working hours, receive 10% of the world's income but own less than 1% of world properly". This statement alone justifies, serious, positive, down to

presence felt, with a difference, in the present male dominated society in all the spheres of work. In spite of such vast areas where women have proved their excellence, it is still

Women struggle with a variety of deprivations that make her vulnerable differently and at different levels. It is no secret that the struggle of women starts right from her birth or even before her birth and continues till her last breath. Among the disadvantaged groups the women are double marginalized, first being women and second from the disadvantages community/region. Thus they bear the burnt of being doubly marginalized. Below is a glimpse of indicators for women and gender equality for India.

Indicators for women empowerment and gender equality	
Gender Inequality Index (GII) (2011)	0.617
GII Rank out of 146 (2011)	129
Gender Related Development Index (GDI)	0.59
Index of 'Economic Participation and Decision-making Power'	0.546
Proportion of seats held by women in Parliament (%)	10.70
Gender Parity Index for education (Primary)	0.98
Gender Parity Index for education (Secondary)	0.85
Gender Parity Index for education (Tertiary)	0.70
Ratio of literate women to men, 15-24 years old (2007-08)	0.88
Gender Gap in Literacy (2011)	16.68

Source: Human Development Report, 2011& Census, 2011

Thus, the issue of women's empowerment alongwith the vulnerable and marginalized one and women in difficult circumstances needs special attention and intervention.

From Welfare to Empowerment

After attaining independence, the Government of India, initially decided to pave a path to bring about social change based on three major areas, *viz*., constitutional and legal reforms, planned development based on mixed economy and state support to social welfare activities. All these three measures weremade to create a democratic, just and prosperous society.

The initial efforts for bringing women to mainstream were for *welfare* of women. These were mainly service providing in nature and were directed towards access to the resources and services. This is the oldest approach in which all developmental efforts which takes place in form of delivery of goods and services (food aid, relief aid, family planning programmes, etc.) fall into the category of welfare approach. The welfare approach is criticized on the grounds that it sees women solely in their reproductive role and that it does not question the traditional roles assigned to women.

The idea of Women *Empowerment* came forward when the Third International Women's Conference at Nairobi in 1985 introduced and defined "women empowerment- as a re-distribution of social power and control of resources in favour of Women" (Goswami, 2013). So, it is a multidimensional social process that helps people to gain controls their own lives and thus enhancing their position in the power structure of the society (Baruah, 2013).A framework developed by Longwe (1991) provides some useful distinctions between different degrees of empowerment (with the numbered list below moving up towards increased empowerment):

1. The welfare 'degree': where basic needs are satisfied. This does not necessarily require structural causes to be addressed and tends to view those involved as passive recipients.
2. The access 'degree': where equal access to education, land and credit is assured.
3. The conscientisation and awareness-raising 'degree': where structural and institutional discrimination is addressed.
4. Theparticipation and mobilization 'degree': where the equal taking of decisions is enabled.
5. The control 'degree': where individuals can make decisions and these are fully recognised.

The World Bank has identified empowerment as one of the key constituent elements of poverty reduction and as a primary development assistance goal. The promotion of women's empowerment as a development goal is based on the dual argument that social justice is an important aspect of human welfare. The Policy Research Report of the World Bank has also identified gender equality both as a development objective and as a means to promote growth, reduce poverty and promote better governance. Beijing Declaration (1995) presented women's empowerment as a key strategy for development and stated that "women's full participation on the basis of equality in all spheres of society, including participation in the decision making process and access to power are fundamental for the achievement of equality, development and peace.

The constitution of India has given special attention to the needs of women to enable them to exercise their rights on equal footing with men and participate in national development. It aims at creation of an entirely new social order where, all citizens are given equal opportunities for growth and development and that no discrimination takes place on the basis of race, religion, caste, sex, etc. The committee on status of women, in its report 'towards equality' (1975), has

mentioned, "Women are considered to be handicapped by social customs and social values and, therefore, social welfare services have specially endeavoured to rehabilitate them."

Framing of the *five year plans* was the first major step taken in the direction of welfare state: Jawaharlal Nehru, the first Prime Minister of India and the pioneer of five year plans, stressed on welfare of women, children and tribal in our country. It was only in the Sixth Five Year Plan the development of women had been considered a separate issue. Until then they were provided welfare services along with other weaker and handicapped sections. It was, for the first time that a chapter on women and development had been documented in the Sixth Plan. According to the document four strategies namely (i) Economic independence, (ii) educational advance, (iii) access to health care and family planning (iv) income supplementing of tribal women, were emphasized.

The Eighth Five Year Plan strategy for women's development covers new thrust areas such as improving women's education, database, enumeration of women workers, and provision of supportive services, encouraging women's organizations and stepping up social security measures. The government has also initiated certain programmes for women. They are social welfare, nutrition service, supplement income generation, girls education, equal remuneration for equal work, hostels for working women and crèches for children, functional and legal literacy, family, promotion and strengthening of self-employment, review and streamlining laws concerning women etc.

India has pledged itself to gender equality through several Articles of the Constitution.

- **Article 14:**Men and women to have equal rights and opportunities in the political, economic and social spheres.
- **Article 15(1):** Prohibits discrimination against any citizen on the grounds of religion, race, caste, sex etc.
- **Article 15(3):** Special provision enabling the State to make affirmative discriminations in favour of women.
- **Article 16:** Equality of opportunities in matter of public appointments for all citizens.
- **Article 39(a):**The State shall direct its policy towards securing all citizens men and women, equally, the right to means of livelihood.
- **Article 39(d):** Equal pay for equal work for both men and women.
- **Article 42:** The State to make provision for ensuring just and humane conditions of work and maternity relief.
- **Article 51 (A) (e):** To renounce the practices derogatory to the dignity of women.
- **Article 46:** Promotion of educational and economic interests of Scheduled Castes, Scheduled Tribes and Other Weaker Sections

In fulfilment of this constitutional mandate, several steps have been taken since independence to empower women, including a series of women-specific and women related legislations and creation of national policy level commitments. A brief description of the acts passed for bridging the gender gap is as follows:

- Equal Remuneration Act of 1976 provides for equal pay to men and women for equal work.
- Hindu Marriage Act of 1955 amended in 1976 provides the right for girls to repudiate a child marriage before attaining maturity whether the marriage has been consummated or not.
- The Marriage (Amendment) Act, 2001 amended the Hindu Marriage Act, Special Marriage Act, Parsi Marriage and Divorce Act, the Code of Criminal Procedure providing for speedy disposal of applications for maintenance; the ceiling limit for claiming maintenance has been deleted and a wide discretion has been given to the Magistrate to award appropriate maintenance.
- The Immoral Traffic (Prevention) Act of 1956 as amended and renamed in 1986 makes the sexual exploitation of male or female, a cognizable offence. It is being amended to decriminalize the prostitutes and make the laws more stringent against traffickers.
- An amendment brought in 1984 to the Dowry Prohibition Act of 1961 made women's subjection to cruelty a cognizable offence. The second amendment brought in 1986 makes the husband or in-laws punishable, if a woman commits suicide within 7 years of her marriage and it has been proved that she has been subjected to cruelty.
- Child Marriage Restraint Act of 1976 raises the age for marriage of a girl to 18 years from 15 years and that of a boy to 21 years and makes offences under this Act cognizable.
- Medical Termination Pregnancy Act of 1971 legalises abortion by qualified professional on humanitarian or medical grounds. The Act has further been amended specifying the place and persons authorized to perform abortion and provide for penal actions against the unauthorized persons performing abortions.
- Indecent Representation of Women (Prohibition) Act of 1986 and the Commission of Sati (Prevention) Act, 1987 has been enacted to protect the dignity of women and prevent violence against them as well as their exploitation.
- The Protection of Women from Domestic Violence Act, 2005 provides for more effective protection of the rights of women guaranteed under the Constitution who are victims of violence of any kind occurring within the family and for matters connected therewith or incidental thereto. It provides for immediate and emergent relief to women in situations of violence of any kind in the home.

At the inauguration of the XI Five Year Plan, nearly 60 years after women's rights were enshrined in the democratic fabric of India, we are yet to fully honour our constitutional commitments. Indian women, in general, do not have equal rights as men in either political, social or economic spheres; they are discriminated against in jobs and in education; they are not equally represented in public institutions; they do not enjoy equal pay for equal work; and violence against women in both public and the private spheres is increasing, with impunity for the perpetrators and little justice for women.

Plans and Policies for Women Empowerment

Gender Sub-Plan

Report of the Committee on the Status of Women in India, in 1974 gave a new impetus towards gender perspectives on public expenditure. Under Eighth Five Year Plan (1992-97), for the first time in India, Planning Commission high-lighted for the need to ensure a definite flow of funds from the general developmental sectors to that of women. "The benefits of development from different sectors should not bypass women and special programmes on women should complement the general development programmes. The latter, in turn, should reflect greater "gender sensitivity" as not much progress was made in terms of ensuring adequate flow of funds and benefits to women.

Women Component Plan

Ninth five Year Plan (1997-2002) adopted "Women Component Plan" as one of the major strategies of planning and budgeting and directed both the Central and State Governments to ensure that 'not less than 30 per cent of the funds/benefits are earmarked in all the women's related sectors". It also directed that a special vigil be kept on the flow of the earmarked funds/benefits through an effective mechanism to ensure that the proposed strategy brings forth a holistic approach towards empowering women.

National Policy for Women Empowerment (2001)

The goal of the National Policy for Women Empowerment (2001) is to bring about the advancement, development and empowerment of women. Specifically, the objectives of this Policy include -

1. Creating an environment through positive economic and social policies for full development of women to enable them to realize their full potential.
2. The de-jure and de-facto enjoyment of all human rights and fundamental freedom by women on equal basis with men in all spheres – political, economic, social, cultural and civil.
3. Equal access to participation and decision making of women in social, political and economic life of the nation.
4. Equal access to women to health care, quality education at all levels, career and vocational guidance, employment, equal remuneration, occupational health and safety, social security and public office etc.
5. Strengthening legal systems aimed at elimination of all forms of discrimination against women. Changing societal attitudes and community practices by active participation
6. Mainstreaming a gender perspective in the development process.
7. Elimination of discrimination and all forms of violence against women and the girl child; and
8. Building and strengthening partnerships with civil society, particularly women's

Therefore, National Policy for Empowerment of Women (2001) made concrete suggestions towards the introduction of a gender perspective in the budgeting process. Specifically, it promised:

i. Developing "Gender Development Indices" (GDI), by networking with specialized

ii. Undertaking "Gender auditing and development of evaluation mechanisms".

iii. Undertaking the collection of "Gender-disaggregated data" by all primary data collecting agencies of the Central and State Governments as well as research and academic institutions in the Public and Private Sectors.

The National Policy on Education (1986)

The National Policy on Education, 1986 recognised that the empowerment of women is possibly the most critical pre-condition for the participation of girls and women in the educational process. The Mahila Samakhya Programme was launched in 1988 to pursue the objectives of the National Policy on Education, 1986. It recognised that education can be an effective tool for women's empowerment, the parameters of which are:

- enhancing self-esteem and self-confidence of women;
- building a positive image of women by recognizing their contribution to the society, polity and the economy;
- developing ability to think critically;
- fostering decision making and action through collective processes;
- enabling women to make informed choices in areas like education, employment and health (especially reproductive health);
- ensuring equal participation in developmental processes;
- providing information, knowledge and skill for economic independence;
- enhancing access to legal literacy and information relating to their rights and entitlements in society with a view to enhance their participation on an equal footing in all areas.

Sakshar Bharat /National Literacy Mission

Historically, a variety of factors have been found to be responsible for poor female literate rate, such as gender based inequality, social discrimination and economic exploitation, occupation of girl child in domestic chores, low enrolment of girls in schools, and low retention rate and high dropout rate etc. Therefore, the main strategies adopted by the Government for increasing female literacy in the country include, imparting Functional Literacy, Universalization for Elementary Education and Non-Formal Education. The National Literacy Mission or Sakshar Bharat Mission, with its objective of extending educational options to those adults who have no access to formal education, targeted female literacy as a critical instrument for women's empowerment. Now, NLM as revised Sakhshar Bharat focus on Women and Backward Communities like SCs, STs, OBCs and Minorities etc. as its core target groups.

National Nutrition Policy (1993)

Till the end of the IV PIan, India's main emphasis was on the aggregate growth of the economy and reliance was placed on the percolation effects of growth. In the face of continuing poverty and malnutrition, an alternative strategy of development comprising a frontal attack on poverty, unemployment and malnutrition became a national priority from the beginning of the Fifth Plan. This shift in strategy has given rise to a number of interventions to increase the purchasing

security system through which the most vulnerable sections of the poor (viz. women and children) can be protected.

National Population Policy (2000)

In the new millennium, nations are judged by the well-being of their people; by levels of health, nutrition and education; by the civil and political liberties enjoyed by their citizens; by the protection guaranteed to children and by provisions made for the vulnerable and the disadvantaged. Women in India constitute about 496 million (2001 census) representing 48 per cent of the total population. Such a high per cent of valuable human resource face disparities in access to and control over resources and constitute as one the most vulnerable and marginalized. The Population Policy 2000 recognised the plight of women and prescribed

National Health Policy (2002)

A National Health Policy was last formulated in 1983, and since then there have been marked changes in the determinant factors relating to the health sector. Access to, and benefits from, the public health system have been very uneven between the better-endowed and the more vulnerable sections of society. It has been mentioned in the policy document that this is particularly true for women, children and the socially disadvantaged sections of society.

The National Environment Policy (2006)

The policy recognises that a diverse developing society such as ours provides numerous challenges in the economic, social, political, cultural, and environmental arenas. All of these coalesce in the dominant imperative of alleviation of mass poverty, reckoned in the multiple dimensions of livelihood security, health care, education, empowerment of the disadvantaged, and elimination of gender disparities. The National Environment Policy seeks to extend the coverage, and fill in gaps that still exist, in light of present knowledge and accumulated experience. It does not displace, but builds on the earlier policies.

National Mission for Empowerment of Women (2011)

The National Mission is the outcome of the recommendations of the Committee of Governors, headed by Dr. A R Kidwai. It is an Inter-Ministerial Convergence mechanism which will oversee the functioning of the programmes, policies and schemes for gender empowerment of various Ministries and Departments of the Government of India as well as State Governments and Panchayati Raj Institutions for socio-economic empowerment of women and for better coordination and synergy among stakeholders. The scheme has been launched since 2011-12. The National Mission for Empowerment of Women (NMEW) was launched by the Government of India (GoI) on International Women's Day in 2010 with the aim to strengthen overall processes that promote all-round Development of Women.

It has the mandate to strengthen the inter-sector convergence; facilitate the process of coordinating all the women's welfare and socio-economic development programmes across ministries and departments. The Mission aims to provide a single window service for all programmes run by the Government for Women under aegis of various Central Ministries. In light with its mandate; the Mission has been named Mission Poorna Shakti, implying a vision for holistic empowerment of Women.

Some other Programmes for Women

To increase employment among women, several initiatives have been taken by Government of India, and programmes have been launched for the economic empowerment of women. Some of these are:

- Swawlamban, the erstwhile Training-cum-Employment Programme for Women, provides skill training to women to facilitate their employment or self- employment on a sustained basis in traditional and non- traditional trades. Till December 2002, 902 projects including 262 continuing projects benefiting 58,458 women were sanctioned. With effect from 1.4.2006, Swawlamban is being transferred to the States. During 2005-06, 7660 beneficiaries availed benefits under the scheme.
- The Department has initiated the gender budgeting exercise to assess the impact and outcome of Government spending on Women. Gender Budget Cells have been set up in 9 Departments/Ministries namely, Health, Family Welfare, Elementary Education and Literacy, Labour and Employment, Rural Development, Social Justice and Empowerment, Tribal Affairs, Urban Employment and Poverty Alleviation and Small Scale Industries.
- Measures have been initiated for preparing Gender Development Index for the States and Districts.
- Support and Training for Employment Programme (STEP) provides updated skills and new knowledge to poor and asset-less women in traditional occupations for enhancing their productivity and income generation. A package of services such as training, extension, infrastructure, market linkages, etc. is provided besides linkage with credit for transfer of assets. Since its inception in 1987, about 0.8 million women have been covered under various projects till 2008-09. Since 2005-06, each year between 31,000 to 40,000 women benefit under STEP. So far women in dairying sector have received maximum support keeping in view the nature of demands. This is followed by handlooms, handicrafts, sericulture, piggery and poultry.

Conclusion

In Indian society, women have a multi-dimensional role. They have a major role to play in the development process also. For the last few years, programmes for women have been receiving particular attention under community and rural development programmes. The desirable socio-economic development can be achieved only when women in large are stimulated and motivated to accept and adopt new techniques. To sum up, women empowerment cannot be possible unless women come with and help to self-empower themselves. There is a need to formulate reducing feminized poverty, promoting education of women, and prevention and elimination of violence against women. It may be concluded that women have shifted traditional assumptions about their roles and capabilities. There has been a marked change, and it has been for the better. Many of its benefits however have yet to touch the majority and all of us continue to experience various forms of gender discrimination. If laws designed to address the concerns of women are to have a dramatic and positive impact on women's lives, they must be sensitive to the social, economic and political disempowerment of women throughout the world.

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SOCIAL SECURITY SCHEMES FOR WOMEN IN WATERSHED AREAS

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Watershed development is not just about livelihood but also capacity building. Watershed Development approaches have evolved from externally imposed biophysical interventions towards more participatory approaches encompassing a broader range of activities. Social studies have shown that women involvement in agriculture is very high in rural areas. Women play an important and significant role in watershed development activities. The role of Women in watershed projects is mainly to increase wages through the watershed earth works. The income generation activities were implemented through the watershed credit system. Village Women get livelihood assurance from watershed activities. Training and demonstration programs implemented have instilled confidence in them. Apart from these, women play an important role and show their active participation in the watershed areas, through SHGs.

Effective Watershed management requires the active participation of women in Watershed management schemes, policies and programmes. The policy makers of all developmental sectors are now considering the Self Help Groups (SHGs) as a focal point assuming it as the only significant institution of poor to provide an institutional avenue for economic self sufficiency.

more easy now a days. Social Security Schemes are implemented by different Departments of the state as well as central Government. The implementation of these schemes or programmes is monitored specifically with reference to coverage of women. The brief description of the programme with specific gender provision is as under:

Swayamsidha: It is an integrated project for the development and empowerment of women. It is based on the formation of women into Self Help Groups (SHGs) with emphasis on converging services, developing access to micro credit and promoting micro enterprises. The long term objective of the scheme is to achieve an all-round empowerment of women, especially socially and economically by ensuring their direct access to, and control over, resources through a sustained process of mobilization and convergence of all ongoing sectoral programmes. The composite project will be implemented by the Project Implementing Agency (PIA) which may be any appropriate government or non-government agency to be nominated by the State Government.

Rajiv Gandhi Scheme for Empowerment of Adolescent Girls (RGSEAG): The scheme aims at covering all out-of-school Adolescent Girls in the age group of 11 to 18 years who would assemble at the Anganwadi Centre on a fixed day at regular interval. The others, i.e., school-going girls, meet at the AWC at least twice a month, and more frequently (once a week) during vacations/holidays. Here they receive life skills education, nutrition and health education, awareness about socio-legal issues, etc. This provides an opportunity for mixed group interaction between school-going and out-of-school girls, motivating the latter to also join

school and help the school going to receive the life skills. This scheme mainly aims at reducing the dropout rate of Adolescent Girls by increasing their literacy rate and work participation.

Swadhar Shelter Home: It provides primary need of Shelter, food, clothing and emotional support and counselling services to the marginalized women/girls living in difficult circumstances who are without any social and economic support.

Ujjawala: The main objective of this scheme to prevent trafficking of women and children for commercial sexual exploitation through social mobilization and involvement of local communities, awareness programmes, workshops/seminars and other innovative activity. It also helps to facilitate rescue of victims from the place of their exploitation and place them in safe custody and provide rehabilitation services both immediate and long-term to the victims by providing basic amenities/needs such as shelter, food, clothing, medical treatment including counseling, legal aid and guidance and vocational training. Besides these it facilitates reintegration of the victims into the family and society at large and repatriation of cross-border victims to their country of origin.

Short Stay Home: To help women who have been victimized by the society by providing short stay facility assuring them their safety and security. The targets groups included the women being forced into commercial sex work, leaving home due to family discord or marital discord , sexually assaulted and not accepted by the family and the females between the age group of 15 to 35. SC/ST, minority/disabled women. It provides temporary accommodation to women coming to town to attend court cases or their legal matters.

Working Women's Hostel: The main objectives are to provide accommodation for single working women, unmarried, widows, divorced, separated or married woman when husband is out of town, women who are being trained for employment provided the training period does not exceed one year and to also provide accommodation to the girl students for a period of five years. The category of women who are being trained for employment and the girl students together should not be more than 30% of the total number of women in hostels. Working women will be entitled to hostel facilities provided their gross income does not exceed Rs. 30,000/- consolidated (gross) per month in metropolitan cities, or Rs 25,000/- consolidated (gross) per month, in any other place.

Mahila and Shishu Desks: The Mahila and Shishu desks provide round the clock service to women and children in distress by establishing helpdesks in all the police stations of Odisha to promote a multi-pronged approach for prevention, rescue and rehabilitation. Five hundred thirty seventh such helpdesks have already been established in Odisha.

Protection of Women from Domestic Violence: Domestic Violence is widely prevalent, but has remained largely invisible due to social forbearance. The Protection of Women from Domestic Violence Act, 2005 came into force on October 26, 2006. PWDVA seeks to protect women from all forms of domestic violence and check harassment and exploitation by family members or relatives. Domestic Violence refers to any act, omission or conduct which causes harm or injury or has the potential of harming or injuring the health, safety or well-being of women or any child in a domestic relationship (arising out of living together with or without marriage).

Indira Gandhi National Widow Pension: A centrally sponsored scheme implemented in the State where the beneficiaries receive pension ® Rs. 300/- per month under the Scheme. Widows within the age of 40 years and above in the BPL category are the target gruops. The

total target at present is 1,94,379 (40-59 years) and 3,34,191(60-79 years) totaling to 5,28,570 beneficiaries.

Mamata: To alleviate the issue of maternal and infant under nutrition, Government of Odisha, has launched a state specific scheme for pregnant women and lactating mothers called MAMATA- a conditional cash transfer maternity benefit scheme. This scheme provides monetary support to the pregnant and lactating women to enable them to seek improved nutrition and promote health seeking behavior. It also provide partial wage compensation for pregnant and nursing mothers so that they are able to rest adequately during their pregnancy and after delivery. The aim of this scheme to increase utilization of maternal and child health services, especially antenatal care, postnatal care and immunization and to improve mother and child care practices, especially exclusive breastfeeding and complementary feeding of infants.

Women's Empowerment Programme (Mission Shakti): Empowerment of women is one of the key development initiatives identified by the Government of Orissa. It is well-known that economic empowerment of women significantly contributes to their social empowerment. As such helping women to achieve economic independence by enabling them to have independent employment and income has been accorded the highest priority. It has also been recognized that women will be better-placed to overcome the negative social pressures and gender biases operating against them and to unshackle themselves through group identity and activity. Promotion of Women's Self-Help Groups (WSHGs) has therefore been adopted as a key strategy for achieving women's empowerment. A Mission approach has been adopted for this purpose through launching of 'Mission Shakti' aimed at promotion of Women's Self-Help Groups. Launched in March 2001, the mission had been entrusted with the task of forming 1,00,000 Women's Self-Help Groups by 2005 @ 25,000 Groups annually over and above the 36,000 odd WSHGs already existing in the State prior to the launching of the Mission. Another important objective of the Mission is to help capacity-building of the existing and the new Groups to be formed to take up income-generating and remunerative economic activities by providing them the necessary technical support, market linkages and credit linkages, where necessary.

Mahila Mandal Programme: This scheme provides Balwadi and maternity services, craft training and health services to women, children and physically handicapped. This programme is a decentralised continuing programme which have been running through 80 centres in the State. Almost 8000 beneficiaries have got the benefit out of the scheme involving an amount of Rs.52,05,460/-.

National Mission for Empowerment of Women (NMEW): The Mission is mandated to facilitate the processes that contribute to economic empowerment of women, eliminate violence against women, social empowerment of women with emphasis on health and education, gender mainstreaming of policies, programmes and institutional arrangements and awareness generation and advocacy for bridging information and service gaps.

Kishori Shakti Yojna (KSY): The objectives of the Scheme were to improve the nutritional and health status of girls in the age group of 11-18 years as well as to equip them to improve and upgrade their home-based and vocational skills; and to promote their overall development including awareness about their health, personal hygiene, nutrition, family welfare and Management.

Rashtriya Mahila Kosh (RMK): It extends micro-credit to poor and underprivileged women through a collateral-free, quasi-formal delivery mechanism where NGOs, women co-operatives, federations etc. act as intermediaries.

Indira Gandhi Matritva Sahyog Yojana (IGMSY): It is a Centrally Sponsored Scheme introduced in 2010-11, which envisages providing cash assistance directly to pregnant and lactating women from the end of 2nd trimester of pregnancy up to 6 months after delivery. Rs.4000 will be provided to the pregnant and lactating women in three instalments in response to fulfilling specific conditions related to health & nutrition of mother and child.

Conditional Cash Transfer Scheme for the Girl Child with Insurance cover (Dhanlakshmi): The scheme is aimed at eliminating discrimination against girl child. Cash transfer is provided to the family of the girl child (preferably the mother) on fulfilling certain conditionalities for the girl child viz. birth and registration of the girl child, immunisation, enrolment to school and retention in school.

The National Creche Fund: It extends day care services to children below five years which would include day-care facilities, supplementary nutrition, immunisation, medical and health care and recreation. Children of parents whose monthly income does not exceed Rs.1800 are eligible for enrolment.

The Indira Awas Yojana (IAY): IAY aims at providing assistance for the construction of houses to the people Below the Poverty Line in rural areas. Under the Scheme, priority is extended to widows and unmarried women. It is stipulated that IAY houses are to be allotted in the name of women members of the household or, alternatively, in the joint names of husband and wife.

Annapurna: The Annapurna Scheme aims at providing food security to meet the requirement of those senior citizens (65 years or above) who though eligible have remained uncovered under the National Old Age Pension Scheme(NOAPS). The scheme came into effect from 1.4.2000 as a 100 per cent Centrally Sponsored Scheme. Free food grains @ 10 kgs per month per beneficiary are provided under this Scheme The State Food and Civil Supplies Departments have been made the nodal Department for implementing the Scheme in view of their access to the existing infrastructure for distribution of food grains through the Targeted Public Distribution System(TPDS) and the Food Corporation of India ensures availability of food grains as per the requirement of the States. The identification of beneficiaries is done by the Panchayats. The Annapurna Scheme is a component of the TPDS which seeks to provide direct nutritional support to indigent senior citizens by entitling them to 10 kg of free grain per month. As on 25 May 2004, there were altogether 64,800 beneficiaries under this scheme in Orissa.

Antyodaya Anna Yojana (AAY): This programme was introduced in December 2001 and is targeted at the ultra-poor and destitute households as identified by Gram Panchayats and Gram Sabhas/Palli sabhas. The households so identified are supplied with special ration cards. Under this scheme, the Antyodaya households are provided with 35 kg of rice per household per month at Rs 3 per kg. Apart from broad guidelines provided by the Government of India for execution of the scheme, some specific guidelines are followed in order to focus on priority groups belonging to the BPL category for the purpose of entitlement under this scheme. For example, in the case of Orissa, the following criteria have been laid down to identify households who are likely to be most vulnerable in terms of nutritional stress.

(i) Households headed by widows or terminally ill or disabled persons or persons aged 60 years or more with no assured means of subsistence or societal support.

(ii) Widower or terminally ill persons or disabled or aged 60 years or more or single women or men with no family or societal support or assured means of subsistence.

(iii) All primitive tribal households.

Anganwadi Karyakartri Bima Yojana: The Govt. of India has provided insurance cover to the Anganwadi Workers and Helpers through an insurance scheme named "Anganwadi Karyakartri Bima Yojana" under the Life Insurance Corporation's Social Security Group Scheme with effect from 1.4.2004. The premium under the scheme is Rs. 280/- per annum per member. Out of this Rs. 100/- will be borne by the LIC of India out of their Social Security Fund, Rs. 100/- by the Government of India and the balance Rs. 80/- will be paid by AWW/Helper.

Emergency Feeding Programme: The intensity of poverty in the KBK region caused by low productivity of agriculture and the devastation of forest-based livelihoods has, over the years, resulted in poor, nutritional status of the population and low life expectancy. The old lack the capability of earning and contributing to the family income. The endemic poverty and low household incomes tend to result in the neglect of the old and the infirm in the matter of food allocation within the family. The objective of this food-based intervention is to provide one square meal a day to old, infirm and indigent persons on a sustained basis which will help the poorest and most vulnerable section of the rural population to cope with food insecurity and food distress periods to break the food insecurity cycle. The Programme is also expected to have an impact on the life expectancy of the people in the area.

The State Old Age Pension Scheme: It was introduced in the State w.e.f. 1.4.1975. Under the Scheme, State Govt. are providing pension @ Rs.100/- per month to old and destitute persons of 60 years of age and above, to leprosy patients with visible signs of deformity and to destitute widows irrespective of age. For all categories, the annual income of the beneficiaries must not exceed Rs.3200/-.

National Old Age Pension (NAOP) Scheme: Under this scheme, old and destitute persons of 65 years of age and above are provided a monthly pension @Rs.75/- by the Govt. of India. The State Govt. supplements another Rs.25/- per month to each beneficiary to bring the quantum of pension at par with that provided under the State Old Age Pension Scheme, i.e., Rs.100/- per month. The current target under this Scheme is 4,93,400. The pension amount has been increased from Rs.100/- to Rs.200/- w.e.f. March 2006 payable in April.06 by the Government**.**

National Family Benefit Scheme (NFBS): Under this Scheme, financial assistance is provided to a BPL family on the death of its primary breadwinner in the age group of 18-64 years. A one-time lumpsum family benefit of Rs.10,000/- is being provided to the eligible households in such an event. The amount is paid to such surviving member of the 'household' of the deceased who, after local inquiry, is determined to be the head of the household. The household includes spouse, minor children, unmarried daughters and dependent parents. In case of the death of an unmarried adult, the term 'household' would include minor brothers/sisters.

Balika Samriddhi Yojana (BSY): The scheme 'Balika Samriddhi Yojana' was launched on 2nd October, 1997 with the objective of raising the overall status of the girl child and bringing about a positive change in the family and community attitude towards the girl child. The

Scheme covers upto two girl children born on or after 15th August 1997 in families living below the poverty line. During 1997-98 and 1998-99, the scheme was implemented as a Central Plan Scheme under which funds were released to the district level implementing agencies for giving a grant of Rs.500/- to the mother of the newborn girl child.

Programme for Care of Older Persons: In order to provide care and protection to elderly and destitute elderly persons of age 60 years and above, the State Government is running 3 Old Age Homes--one at Nimapara in Puri District ,at Raghunathpur in Jagatsinghpur district and at Bhubaneswar in Khurda district. These Old Age Homes are managed by NGOs with financial assistance provided by the State Government in the shape of grant-in-aid. Each Home has an intake capacity of 25. An amount of Rs.8.94 lakhs has been provided for maintenance of these homes from the current year's budget for this scheme. There are 43 Old Age Homes also being run by NGOs with the financial assistance from the Government of India.

Prevention of Alcoholism and Substance (Drugs) Abuse: To create awareness about the ill effects of alcohol, 32 Drug De-addiction Centres managed by different NGOs are functioning in different districts of the State with the financial assistance from GoI**.**

Scheme for Welfare of Orphan and Destitute Children: The objective of this programme is to prevent destitution of children and thus there is provision for shelter, nutrition, Health care, Education and vocational guidance for orphaned and destitute children throughout the State. Orphan and destitute children in the age group upto 18 years (for boys) and upto 25 years (for girls) are covered. This scheme is a State Government initiative and is implemented through Voluntary Organizations/NGOs.

Orissa Disability Pension (ODP) Scheme: The scheme is a State Government initiative introduced on the 2nd October,1984. Persons who are five years of age or above and are totally blind, orthopaedically handicapped, mentally retarded or affected by cerebral palsy receive an amount of Rs.100/- per month as pension under the scheme. The amount has been enhanced to Rs.200/- p.m per beneficiary in March 2006-07. The eligibility is subject to an annual income of Rs. 11,000/-, or less. The coverage target under the scheme was 100,000 beneficiaries in 2003-04 and 1,15,000 in 2004-05 and 1,25,000 for 2005-06.

Social security schemes encompass the objective of providing protection to the vulnerable poor in order to empower them and make them self reliant. They seek to promote and enhance the economic and social strength of the insecure and vulnerable poor.

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VALUE ADDITION OF HORTICULTURAL PRODUCTS

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In India food security, both in terms of availability and access to food, poses a challenge to rapidly growing population. However, our country has made significant progress in horticulture due to profitability and opportunities. Huge post harvest losses result in diminished returns for producers. India's horticulture production has crossed all time high of over 240 million tones and earned foreign exchange worth Rs14,000 crore from export. Horticulture occupies hardly 8.5% of the cropped area and contribute over 30% to the gross agricultural output in the country. Among horticultural crops, fruits and vegetables have the lion's share of more than 85% (205 million tonnes) of production; however they also experience high PHT losses (30-40%). Considering whooping post harvest loss the actual production of fruits and vegetables is 140 million tones and consequently the per capita availability of fruits and vegetables reduced to 110g and 205g respectively, which is still less than the ICMR recommendation of 120 g/day and 300 g/day fruits and vegetables respectively. M
costs thereby increasing the price to the consumer. The fruit production in India has recorded a growth rate of 3.9 per cent, whereas the fruit-processing sector has grown at about 20 per cent per annum. However, the growth rates have been extensively higher for frozen fruits and vegetables (121%) and dehydrated fruits and vegetables (24%). Similarly it is estimated that around 30-40 per cent of the vegetables is lost due to poor post harvesting practices. Less than 2 per cent of the total vegetables produced in the country are commercially processed as compared to 70per cent in Brazil and 65 per cent in USA. Around 1.5 lakh MT of vegetables is sold as processed products.

Post harvest management, processing, storage and utilization of horticultural products are generally the domain of women at home scale. Even in post harvest handling and processing, the involvement of women is very high. Value addition, product diversification and by-product utilization has been given top priority in the recent years. The rural and tribal women have obtained expertise in the traditional foods and formulations through inherited knowledge. The commercial utilization of these formulations and products by small scale enterprises may be helpful in the income enhancement and additional employment of women. Further the new products and changing preferences of the consumers are opening new avenues for the small and medium scale enterprises in post harvest handling and value addition.

Manual harvesting and post harvest operations in horticultural crops are widely practiced due to availability of agricultural labour and lack of machinery or tools. If these provide income, the work is invariably poorly paid. These activities are drudgery prone operations which are time-consuming, repetitive and arduous. Many traditional post-harvest activities can be described as drudgery: harvesting, grading, peeling, pulping, grinding and pounding, preparation of processed products, marketing and load-carrying.

Preservation can be defined as the process which deals with the prevention of decay or spoilage of fruits and vegetables, thus allowing it to be stored in a fit condition for future use. After harvesting, all activities till consumption comes under preservation. Some products are used immediately after harvesting but some can be kept for long time under low temperature storage. Due to improper storage lot of fruits and vegetables are either spoiled or are sold at a very low price. By converting fruits and vegetables into preserved products, lot of wastage can be saved (Table 1).

Table 1. Preserved products of fruits and vegetables

Fruits	Preserved Products
Mango	Sarbat, Nector, squash, murrabba, toffee, amchur, pickle, chutney, canned mango slices.
Guava	Jelly, squash, toffee, nector, sarbat
Amla	Murrabba, Jam, candy, squash, pickle, chutney, dry powder, triphala, chayanprash
Pomegranate	Sarbat, squash, syrup, murrabba
Pineapple	Canned slices, sarbat, syrup, jam
Litchi	Juice, nector, squash, syrup, canned litchi, litchi nut
Papaya	Jam, candy, nector, pickle, papain, cubes
Grapes	Sarbat, kismis, munakka, pickle
Goose berry	Jelly, candy, murrabba, pickle
Amana	Canned, chips, toffee
Loquat	Jam, jelly, canned loquat
Ber	Candy, murrabba, jam
Bael	Murrabba, nector, sarbat, cider
Phalsa	Juice, squash, sarbat, vinegar
Jackfruit	Pickle, jam, chips
Orange	Juice, nector, cardial, squash, syrup
Lime	Juice, sarbat, pickle, marmalade
Jamun	Jelly, syrup, vinegar, cidu
Strawberry	Jam, juice
Apple	Jam, murrabba, juice, chutney, cider
Cherry	Jam, chutney, canned cherry, dry cherry
Peach	Jam, chutney, canned peach, dry peach
Aloo Bukhara	Jam, chutney, sauce, dry aloo bukhara
Khajoor	Chuhara, pind khajoor, sarbat, jam

Fruits	Preserved Products
Tomato	Sauce, chutney, puree, paste, juice, soup, canned tomato, tomato powder
Cauliflower	Pickle, dry cauliflower, canned gobhi
Carrot	Jam, pickle, murrabba, candy, canned carrot
Cabbage	Dry cabbage, pickle
Green pea	Canned pea, bottle pea, dry pea, mixed pickle
Green Chilli	Pickle
Beet	Pickle, canned pickle
Pointed gourd	Canned parwal, parwal sweet, dry parwal
Petha (gourd)	Candy, murrabba
Water melon	Juice, sarbat, squash
Musk melon	Juice, squash
Bitter gourd	Pickle, dry bitter gourd
Onion	Pickle, vinegar, dry onion
Garlic	Pickle, dry powder, paste
Sem	Pickle, canned sem, dry sem
Ginger	Pickle, murrabba, candy, dry ginger powder
Mushroom	Pickle, canned mushroom, dry mushroom
Potato	Chips, papad, starch
Elephant foot yam	Pickle
French bean	Pickle, canned French been

Methods of Fruits and Vegetable Preservation

1. Drying of fruits and vegetables

Dehydration or drying is the process by which surplus water is sought to be removed without decreasing the taste and nutritive value of the foods. Preservation of foods by drying is one of the oldest method used by man. The principle of dehydration is that bacteria are unable to survive in the absence of moisture. Sun drying is the most common method of drying but now a days self operated machines are used by which the drying is done at low temperature which increases the quality and variety of products that are preserved. Sun drying is easiest and cheapest method of preserving fruits and vegetables, but this method is used only in dry and hot season. In common practice for drying of fruits / vegetables cloths are used. Large aluminium plates greased with oil are more suitable for the drying purpose. They can be easily covered, transported and cleaned well. Peeling off the dried food from the cloth is a time consuming process and the time required for this can be saved by using greased aluminium plates.

Table 2. Methods of fruits and vegetables preservation

Fruit / Vegetables	Preparation before drying	Temperature of Drying	Remarks
Banana	Washing, peeling, cutting into pieces (12mm thick)	Sun drying or 55-56^0 C	Sulphur fumes for 30 minutes

Fruit / Vegetables	Preparation before drying	Temperature of Drying	Remarks
Apricot	Washing, boiling in 0.5 caustic soda solution and dipping in water.	Sun drying or 45 – 50^0 C	-
Mango	Washing, peeling, cutting 12mm thick pieces	45 – 50^0C	Dryer drying
Papaya	Washing, peeling, removing seeds, cutting into 6mm pieces	60 – 65^0C	2 hours dryer drying
Amla	1. Washing, grating, salt mixing (50gm / kg) 2. Washing, boiling (4% salt solution), salt mixing	Sun drying Sun drying	- -
Cauliflower	Washing, stem removing, cutting in equal pieces, blanching upto 4 – 5 min.	Sun drying or 55 – 60^0C	-
Cabbage	Washing, stem and outer leaf removal, cutting into small pieces, blanching for 5 – 6 min.	Sun drying or 55 – 60^0C	-
Peas	Removal of seeds from pod, blanching for 3 – 4 minutes	Sun drying or 60 – 65^0C	
Onion	Peeling of skin, cutting into 5mm round thick pieces, display into salt solution	Sun drying or 60 – 65^0C	Dipping into 5% salt solution
Garlic	Skin peeling, whole or 5mm pieces, dipping into salt solution	Sun drying or 60 – 65^0C	Dipping into 5% salt solution
Green leafy vegetables	Sorting, washing, cutting into small pieces, blanching for 2 min.	Sun drying or 60 – 65^0C	-
Potato	Washing, peeling, cutting into 5 / 10mm round pieces, blanching for 3 – 4 minutes	Sun drying or 60 – 65^0C	-
Carrot	Washing, peeling, cutting, into 10mm pieces, blanching for 2 – 4 minutes	Sun drying or 60 – 65^0C	Dip into 2% salt solution

2. Preservation of fruits through sugar

Pulp or juice of fruits can be preserved by sugar with or without fermentation. By this method we can prepare drinks, jam, jellies, candy, murrabba etc. Method of preparation of some products are as follows:

Drinks: For preparing drinks, first juice is extracted from the fruit. After that required amount of sugar is converted into the syrup and mixed with fruit juice. For different fruit juices the amount of sugar and preservative requirement is different. RTS/sharbat, nector, cordial or squash are prepared by using fruit juice, sugar and preservatives.

i) RTS / sharbat : It is ready to serve drink in which there is no need of mixing water. In RTS percentage of fruit juice, acidity and TSS is 10%, 10 – 12% and 0.3%. Preservative is used as per the need. Preparation of sharbat from different fruits is almost same but the amount of fruit juice, sugar and citric acid is different according to the sugar and amount of water present in the fruit juices / pulp.

Table 3. Proportions of various products in the preparation of RTS from fruits:

Fruit	Juice %	Quantity of juice (lit.)	Quantity of sugar (kg)	Citric acid (gm)	Water (lit.)
Bael	10	1.0	1.20	28	7.7
Lime	10	0.5	1.30	-	8.2
Guava	10	1.0	1.25	28	7.7
Amla	10	1.0	1.60	20	10.0
Mango	10	1.0	1.25	28	7.7
Ginger	2.5	0.25	1.30	30	8.4
Amla Mix	Amla 10+ Lemon 2+ Ginger 1	1.0 0.2 0.1	1.60	22	10.0

ii) Squash

Squash is a very popular soft drink in which fruit juice is 25%, TSS is 40-50%, acidity is 1% and Potassium metabisulphite 350 ppm and Sodium benzoate 600ppm. Commonly mango, orange, pineapple are being used for squash preparation but high value squash can be prepared by lemon, ginger, bael, guava, litchi, jamun, phalsa, strawberry etc. Extract pulp or juice from the fruit. Prepare sugar syrup by heating sugar, water and citric acid. Mix thoroughly sugar syrup and fruit juice / pulp. After that mix required amount of preservatives. Dissolve the preservative in a spoon of squash and then mix it in the total product. Fill the squash into bottles and store in a cool and dry place.

Table 4. Proportion of various constituents for the preparation of squash at home level

Fruit	Juice (lit.)	Sugar(Kg.)	Water (lit.)	Citric acid (g)	Preservative(g)
Orange	1.0	1.75	1.0	20	2.5 PMS
Mango	1.0	1.75	1.0	20	2.5 PMS
Lime	1.0	2.0	1.0	-	2.5 PMS
Bael	1.0	1.8	1.0	25	2.5 PMS
Litchi	1.0	1.8	1.0	25	2.5 PMS

Fruit	Juice (lit.)	Sugar(Kg.)	Water (lit.)	Citric acid (g)	Preservative(g)
Pineapple	1.0	1.75	1.0	20	1.9 PMS
Guava	1.0	1.8	1.0	20	2.0 PMS
Papaya	1.0	1.8	1.0	25	2.5 PMS
Phalsa	1.0	1.8	1.0	5	4.0 PMS
Jamun	1.0	1.8	1.0	15	3.0 SB
Water melon	1.0	0.5	0.25	10	1.5 SB

PMS-Potassium metabisulphite, SB-Sodium benzoate

iii) Jam

Jam is used almost in all the houses which can be prepared easily at home level or commercial basis. For preparing jam one can use 'C' or 'D' grade fruits which are not equal in shape, size or texture, because jam is prepared from fruit pulp. Jam is such type of preserved product in which fruit pulp is cooked with sugar till it is converted into a thick product. In our country papaya, aonla, bael, apple, pineapple, sapota, mango etc are used for preparing jam. Jam can be prepared by any fruit but pulpy fruits are good because in these fruits, preparation cost is less. Now-a-days mixed fruit jams are more popular in which main fruits are used in large quantity and others are in small-small quantities. In the prepared jam sugar percentage is 40 and acidity is 0.5 – 0.6%. Jam can be stored for longer period by adding potassium metabisulphide (0.4gm / kg) preservative in it. For preparing jam wash and peel ripe fruits properly. Remove the seeds from the fruits and grind the pulp. Mix adequate amount of sugar and citric acid in fruit pulp and boil. Continue boiling till the total soluble solids of mixture reach 68-70 percent. End point of the jam can be tested by sheet or drop test. Fill the jam into wide mouthed bottle in hot and tight the lid properly.

Table 5. Proportion of various constituents for Jam preparation

Fruit	Pulp (kg)	Sugar (kg)	Citric acid (gm)	Water (ml)
Aonla	1.0	0.75	-	150
Carrot	1.0	0.75	2.0	100
Grapes	1.0	0.70	1.0	50
Guava	1.0	0.75	2.5	150
Loquat	1.0	0.75	1.0	100
Mango	1.0	0.75	1.5	50
Musk Melon	1.0	0.75	2.5	50
Peach	1.0	0.80	3.0	150
Papaya	1.0	0.70	2.0	100
Strawberry	1.0	0.75	2.0	100
Sapota	1.0	0.75	3.0	150
Mixed Jam	1.0	0.80	2.5	100

iv) Jelly

Jelly is also a semi-solid product which is prepared just like jam. The difference between jam and jelly is only that jelly is prepared from a special type of fruit juice having pectin. Pectin is mainly available in guava, sour apple, karonda, cherry, jamun etc.

A perfect jelly is transparent, properly set and full of flavour of that fruit. For a perfect jelly making along with trained person, high quality pectin is also required. The quality of any jelly will depend on the quality of pectin and method of preparation but in all types of jelly 65 percent total soluble solids and 0.5 – 0.75 percent acidity is required. Now-a-days artificial pectin is also available in the market, by using this good jelly can be prepared but we can not faith on quality and nutritive value of the product. The method of preparation of jelly is just like jam in which sugar and citric acid is heated with fruit pulp extract upto the end point. In this method mix one spoon fruit juice in 3 spoon methyl spirit. Mix well and wait for alcohol clot. If pectin availability is high only one hard clot will form, which is known as 'A' grade pectin. For preparing jelly from this fruit pulp extract equal amount of sugar is required. If concentration of pectin is medium ('B' grade) clot will be in small-small soft pieces. For preparing jelly by this pulp extract ¾ amount of sugar is required. If there is no clot, the amount of pectin is very low and only half amount of sugar is required for preparing jelly but this type of jelly is low grade jelly.

Table 6: Proportion of various constituents in jelly preparation

Fruit	Fruit extract (kg)	Sugar (Kg)	Citric acid (gm)
Guava	1	0.75	3.0
Sour apple	1	0.75-1.00	2.0
Karonda	1	0.75	-
Jamun	1	0.75	1.0
Loquat	1	0.80	2.0
Cantha	1	1.00	-

v) Murrabba and Candy: If whole fruits or vegetables are dipped into concentrated solution of sugar in the way so that they are soft, transparent and sweet, this type of product is known as murrabba. If murrabbah is dried in a shade after extraction from sugar syrup and coated with thin layer of powdered sugar, it is known as candy. Aonla, bael, mango, karonda, papaya etc. fruits and carrot, pumpkin etc. vegetables are mainly used for preparing murrabba and candy.

Aonla murabba : Commonly aonla murrabba or candy is prepared on large scale. For preparing murrabba 1.5 kg sugar is required for 1 kg fruit.

Method of preparation: Prick whole, ripe and equal size fruits with machine or fork. Dip pricked fruits in 2% salt solution for 24 hours and in 2% alum for another 24 hours. Blanch fruits for 5 minutes into boiling water. Make sugar syrup of one thread consistency. Dip fruits for 24 hours after cooling of the sugar syrup. Second day take out the fruits from sugar syrup, boil sugar syrup up to two thread consistency and dip fruits for 24 hours. Repeat this process for 4 – 5 day and finally prepare sugar syrup of thick consistency. Store murrabba with sugar syrup in the glass jar.

3. Preservation by using Sugar, Salt, Oil and Spices Fruit Juices

A. Chutney: Chutney as a preserved produced is used almost in all houses which is prepared from various types of fruits and vegetables. As per taste one can prepare sweet, sour, chutpatty or spicy chutney. Chutney is prepared mainly for short time but by using preservative chutney can be used for longer duration also. Chutney should be prepared in stainless steel or aluminium pot instead of iron or copper vessel. It should be stored in a glass or porcelain pot.

In different seasons different types of chutneys are prepared but for longer period use mainly tomato chutney is prepared.

METHOD OF PREPARATION OF TOMATO CHUTNEY:

Ingredients :

Tomato– 1 kg, Sugar – 600 gm, Salt – 25 gm, Small sliced onion –100 gm, Small pieces of ginger–10 gm, Small spices of garlic –10 gm, Red chilli powder–10 gm, Garam masala -10 gm, Vinegar–100 ml and Sodium Benzoate–0.5gm / kg final product

Method :

Select red ripe tomatoes. Boil in water for 2 minutes, peel the skin and grind in a grinder. Boil tomato juice with all the ingredient except salt, vinegar and preservative to a thick consistency. Now add salt and vinegar and boil for 5 minutes. Add preservative and fill the bottle in hot condition.

Method of Preparation:

Take red, ripe tomatoes, wash properly and cut into small pieces. Boil cut tomatoes in small quantity of water and grind in a grinder or pulper. Separate pulp from skin and seeds. Boil tomato pulp with sugar and spices and condiment, which are tightened in a muslin cloth. Continue boiling until the final product will be one third of the previous pulp. Now add salt, acetic acid, vinegar and sodium benzoate and fill into narrow mouthed bottles in hot condition.

B. Pickle: Pickle is the oldest method of preserving fruits and vegetables into salt, oil, spices or condiments, lemon juice or vinegar in whole or pieces form. Various types of pickles are available in the market but mango, chilli and mixed pickle are more common. At home level according to the need and availability of fruits and vegetables so many types of pickles are being prepared. To prepare a good quality pickle it is very important that the raw material should be of good quality and free from any bacteria or fungi. If hygienic condition and cleanliness is maintained, pickle is filled with oil, it can be keep for a longer duration. Pickle can be prepared by using various types of preservatives such as salt, vinegar, oil, lemon juice and vinegar

1. **Pickle by using salt:** By this method sour lemon pickle, sweet and sour lemon pickle, hot and sour green chilli pickle, sour mango pickle and sweet and sour mango pickle can be prepared. Salt concentration in pickle increases the taste as well as of quality and decreases the fermentation of fruits and vegetables. If salt concentration is around 15 percent, it also checks the spoilage through micro-organism.
2. **Pickle by using vinegar:** Pickle can be prepared by preserving fruits and vegetables into vinegar (more than 10% acetic acid). Demand of vinegar pickle is high in foreign countries. By this method mango, ginger, garlic, chilli, jack fruit pickles are being prepared.
3. **Pickle by using oil:** Oil is one type of preservative and in these method pieces of fruits and vegetables is dipped into the oil.

Despite development and improvements in existing practices large numbers of farm women are deprived of modern' technology. Although technological innovation and adaptation are important, many factors affect women's ability to benefit from technological change - and these are often location-specific. Women will not be benefited from hardware development unless technical, institutional and socio-economic issues are addressed.

DEVELOPING ACTION PLAN, MONITORING AND EVALUATION OF GENDER MAINSTREAMING IN WATERSHEDS

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Programme Planning

Planning is a process which involves studying the past and present in order to forecast the future and in the light of that forecast, determining the goals to be achieved and what must be done to reach them. Programme planning is a decision making process involving critical analysis of the existing situation and the problems, evaluation of the various alternatives to solve these problems and the selection of the relevant ones, giving necessary priorities based upon local needs and resources by the cooperative efforts of the people both official and non-official with a view to facilitate the individual and the community growth and development.

Concepts in Programme Planning

Plan

A plan is a predetermined course of action. Plans may be tailored to specific projects, or they may be established as standing plans (eg: five year plans) for future actions. Planning not only involves predetermining a course of action to be taken, but also includes mentally searching for possibilities of future problems that might appear.

Plan of Work

A plan of work is an outline of activities so arranged as to enable efficient execution of the programme. It is a statement of activities to be undertaken by an individual, a group of people or an organization, within a definitely stated time, to carry out the recommendations in the programme. The plan of work indicates what is to be done, who is to do it, how it is do be done, when it is to be done, who are to be served or reached and how the results will be measured.

Calendar of Work

A calendar of work is a plan of activities to be undertaken in a particular time sequence.

Objectives of Programme Planning

The general objective of having an extension/ development programme is to influence people to make changes in their way of life and in making a living. The assumption is that there is need for change and if people are not aware, it is necessary to make them aware of this; and to develop their needs. Following Kelsey and Hearne (1967) the reasons for having a programme may be specifically stated as follows.

1. To ensure careful consideration of what is to be done and why
2. To furnish a guide, against which to judge all new proposals
3. To establish objectives toward which progress can be measured and evaluated

4. To have a means of choosing the important (deep rooted) from incidental (minor, less important) problems and the permanent from the temporary changes
5. To develop a common understanding about the means and ends between various functionaries and organizations
6. To ensure continuity during changes in personnel
7. To help develop leadership
8. To avoid waste of time and money and promote efficiency
9. To justify expenditure and to ensure flow of funds
10. To have available in written form a statement for public use

Steps in Programme Planning Process

1. ***Collection of facts:*** Sound plans are based on availability of relevant & reliable facts. This includes facts about the village people, physical conditions, existing farm & home practices, trends & outlook. Besides, other facts about customs, traditions, rural institutions, peoples' organizations operating in the area, etc. should be collected. The tools & techniques for collecting data include systematic observations, a questionnaire, interviews & surveys, existing governmental records, census reports, reports of the Planning Commission, Central Bureau of Statistics, and the past experiences of people.
2. ***Analysis of the situation:*** After collecting facts, they are analyzed and interpreted to find out the problems and needs of the people.
3. ***Identification of problems:*** As a result of the analysis of facts, the important gaps between 'what is' & 'what should be' are identified & the problems leading to such a situation are located. These gaps represent the people's needs.
4. ***Determination of objectives:*** Once the needs & problems of the people have been identified, they are stated in terms of objectives & goals. The objectives represent a forecast of the changes in the behavior of the people & the situation to be brought about. The objectives may be long-term as well as short-term, & must be stated clearly.
5. ***Developing the plan of work:*** In order to achieve the stated objectives & goals, the means & methods attaining each objective are selected & the action plan, i.e. the calendar of activities is developed. It includes the technical content, who should do what, & the time-limit within the work will be completed. The plan of work may be seasonal, short-term, annual or long-term.
6. ***Execution of the plan of work:*** Once the action plan has been developed, arrangement for supplying the necessary inputs, credits, teaching aids, extension literature etc. has to be made & the specific action has to be initiated. The execution of the plan of work is to be done through extension methods for stimulating individuals & groups to think, act & participate effectively. People should be involved at every step to ensure the success of the programme.
7. ***Evaluation:*** It is done to measure the degree of success of the programme in terms of the objectives & goals set forth. This is basically done to determine the changes in the behaviour of the people as a result of the extension programme. The evaluation is done

not only of the physical achievements but also of the methods & techniques used & of the other steps in the programme-planning process, so that the strong & weak points may be identified & necessary changes made.

8. ***Reconsideration:*** The systematic & periodic evaluation of the programme will reveal the weak & strong points of the programme. Based on these points, the programme is reconsidered & the necessary adjustments & changes are made in order to make it more meaningful & sound.

Programme Planning Model

Sandhu (1965) developed a model for planning extension and rural development programmes. This model has six phases with a number or steps to be followed under each phase.

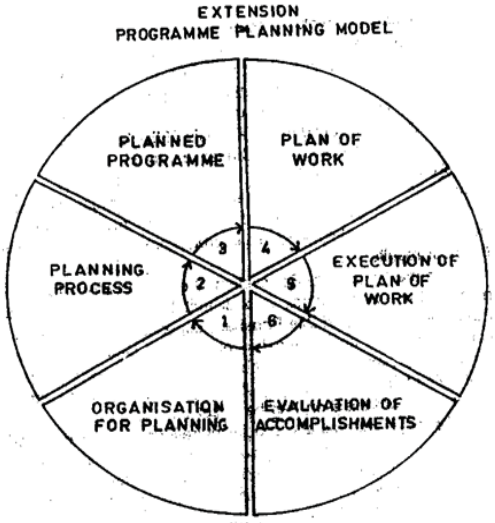

Fig.1. Extension Programme Planning Model

Organisation for Planning

I. Planning Process

i) Reach understanding regarding principles, procedures, roles and time schedule.
ii) Analyse situation.
iii) Determine objectives.
iv) Select problems with due regard to priorities.
v) Find solutions.

II. Planned Programme

Prepare a written statement of:
i) situation
ii) objectives
iii) problems
iv) solutions

III. Plan of work

Prepare a plan of work containing information regarding:

i) people to be reached
ii) goals, dates and places
iii) teaching procedures to be followed
iv) duties, training and recognition of leaders
v) roles to be played by extension/ development personnel
vi) roles to be played by other agencies

IV. Execution of plan of work

i) Make advance arrangement for inputs and teaching aids.
ii) Interpret the approved programme to the staff and people's representatives.
iii) Carry out the planned programme, phase by phase, in a co-ordinated manner.

V. Evaluation of accomplishments

i) Do concurrent evaluation
ii) Do *ex-post facto* evaluation

Before developing such a plan, pause a moment and reflect on what are some of the key questions the plan will have to address:

- What are the expected benefits to stakeholders?
- What are the risks?
- What scale of technological solution do you need?
- What cooperative services are covered?
- Which personnel will be involved in the process?
- How can we ensure good performance?
- How can the system be maintained in the long run?

Once you have given some thought on how you are going to answer these questions, it is time to take the next step: preparation of a detailed project implementation plan. Take your time, because mistakes can be costly. Please also keep in mind that the design process should be as participatory as possible in order to guarantee its success. Consult with others before forging ahead. "Two or more heads are usually better than one."

PREPARING THE PROJECT WORK PLAN AND BUDGET

An easy way to prepare a work plan is by organizing the information you have collected on what you want to do in a hierarchical sequenced fashion: starting with the objective, then moving on to the outputs that contribute to that objective, then to tasks that contribute to achieving the output. A partial work plan for one of probably many objectives for 'Capacity building of farm women on backyard poultry' is shown below:

Table 1. Example for a Plan of Work

Objective	Output	Task	Activity	Who?	When?
1. Capacity building of farm women on backyard poultry	1.1 Improved knowledge and skill of farm women on backyard poultry	1.1.1 Organize training	1.1.1.1 Selection of beneficiaries	Identified staff	10.02.05
			1.1.1.2 Arranging logistic support	-do-	15.02.05

Objective	Output	Task	Activity	Who?	When?
			1.1.1.3. Identification of resource persons	-do-	15.02.05
			1.1.1.4. Conducting the programme	-do-	20.02.05
		1.1.2 Provide necessary inputs	1.1.2.1 Purchase/ procurement	-do-	15.02.05
			1.1.2.2 Distribution	-do-	20.02.05
		1.1.3 Follow up	1.1.3.1 Regular visits and meetings	-do-	30.02.05 (periodically)
			1.1.3.2 Documenting the feedback	-do-	-do-

The next step is to look at the timing and sequencing of all of these outputs, tasks and activities to see how everything fits together. The final step is to assign costs to all of these sequenced actions to determine when funds will be needed to cover the expenses. This information is then arranged in the form of a monthly or quarterly expenditure plan or budget.

Evaluation

The word evaluation was derived from Latin word 'Valare' meaning 'strength of' from which the word 'value' evolved. To evaluate means to appraise or to ascertain the value of something.

Purposes of Programme Evaluation

- ✓ Programme improvement
- ✓ Programme accomplishment
- ✓ Reporting to the public
- ✓ Professional growth
- ✓ Professional security
- ✓ Effective workmanship

Steps in Evaluation

1. Formulation of objectives
2. Sampling
3. Collection of information
4. Analysis of data
5. Look for significant changes
6. Report writing

The objectives must be SMART, stands for: S- Specific; M-Measurable; A-Achievable; R-Realistic; and T-Time bound.

SWOT analysis

SWOT is an acronym symbolizes Strength, Weakness, Opportunity and Threat of an organization.

Concept of Impact Assessment

Impact assessment is a generic term that includes social impact assessment, human impact assessment, environmental impact assessment, technological impact assessment etc. It is a comprehensive process and assessment tool. It provides means for implementing developmental programmes. Assessing the consequences of policies, projects and programmes of agriculture and rural development are essential for ensuring balanced development. Assessment can be defined as a two-way process whereby the stakeholders/ beneficiaries and the extension agency tries to achieve the objective of the developmental programme. Impact refers to the diverse effects on human, community or society which will create changes in the levels of welfare. It also refers to outcome of the results of activities; net effect of activities on economic and social status.

Tools for Participatory Monitoring and Evaluation (PME)

There are many definitions of participatory monitoring and evaluation, but perhaps the simplest is keeping track of changes with the community stakeholders. Ideally, the system of monitoring and evaluation should be planned as an integrated part of project design. It should start before the commencement of project activities, with decisions on what should be monitored, and eventually evaluated. These criteria are often defined as indicators. Furthermore, if the system of monitoring and evaluation is to be truly participatory, the indicators and the means of determining them should be discussed, identified and agreed by the community stakeholders at the beginning. Indeed, it should then be these same stakeholders who decide how often progress should be reviewed, who should do it, using what method, etc.

Who wants to know what has changed?

Although the PME should be based on the ideas and wishes of the community stakeholders, it is a fact that local people rarely demand information in such a structured manner. They form their own opinions. It is usually NGO staff, donor agencies or other interested persons (Government agencies, researchers, journalists) who wish to have changes captured and, if possible, quantified. Consulting local people in a monitoring and evaluation exercise does not automatically make the process participatory. If based on a one-way process of information collection, it can be purely extractive. PME, by contrast, should entail a two-way exchange of information. Most of all, it should be an enjoyable process in which everyone feels that they have learned something. Most of all, PME should be enjoyable Participatory Monitoring and Evaluation.

Appropriate Tools

Participatory Rural Appraisal (PRA) tools are often only seen as appropriate for gathering information at the beginning of an intervention, as part of a process of appraisal and planning. However, PRA tools have a much wider range of potential uses, and can often be readily adapted and used for participatory monitoring, and for participatory evaluation.

Transect walk: is a means of involving the community in both monitoring and evaluating changes that have taken place over the period of programme intervention. This method entails direct observation whilst incorporating the views of community members.

Spider web diagram: in this case, is used as a means for participants to monitor and evaluate key areas of a programme. The spider web is a simple diagrammatic tool for use in discussions; it does not entail any direct field observations.

Participatory mapping: is perhaps the most easy and popular of participatory tools, used to evaluate project interventions.

Photographic comparisons: is another easy visual tool, here used to stimulate community discussions in evaluating programme interventions.

Matrix ranking: in this case used to evaluate the impact of skills training.

Time line: a tool used to elaborate historical change.

Well-being ranking: is being used to differentiate the benefits that different community members have gained from any intervention.

H-form: a simple monitoring, evaluation and impact assessment tool.

THE H-FORM: THE METHOD

This method is particularly designed for monitoring and evaluation of programmes. It was developed in Somalia for assisting local people to monitor and evaluate local environmental management. The method can be used for developing indicators, evaluating activities, and to facilitate and record interviews with individuals.

STEPS IN USING A H-FORM

1. Take a large paper and fold it in half length-wise and then fold it in half width-wise, and then half again width-wise. Unfold the paper and darken the 'H' lines with a pen. Exclude the centre vertical line.
2. Write the question in the top centre of the H-form. This should be simple and lucid. If you have a complicated issue, break it up into many small questions. On the left of the horizontal line of 'H' write 0 representing 'not well' and at the right side 10 representing 'extremely well'.
3. If you are working with a group, ask each individual to place their score along the line between 0–10. Give them each many cards or 'post its' (pieces of paper with a sticky backing) and ask them to write/draw out as many reasons for their score. Only one reason should be written on one card.
4. The participants have to write both positive and negative reasons for their score, which are then collected and pasted on to the respective side, as shown in the figure.
5. The participants are then encouraged to read each other's comments or each participant is made to read out the comments they have written. This is a process of sharing and also to encourage discussion.
6. The next step can be to encourage the group to come out with a consensus group score. Once this is achieved, the group discussion can focus on 'steps ahead', ideas of how to make things better, etc.

7. The results of the exercise can be recorded and analysed further as a step towards monitoring and evaluation and documented in a report.

The diagram showing the 'H' form is given in Fig.1.

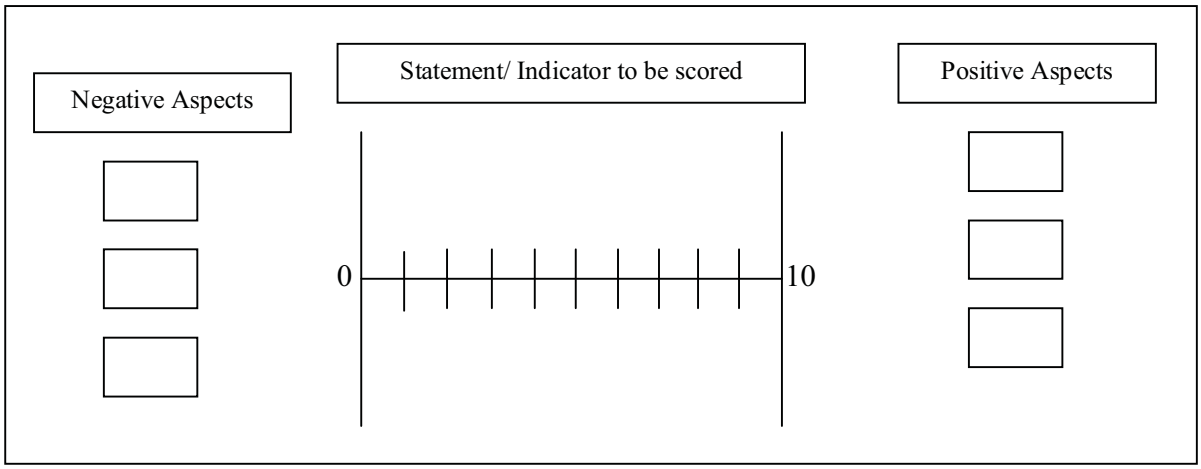

Fig.2. The 'H' Form

PME as an Integral part of all Community-based interventions

However interesting a participatory evaluation at the end of a programme might be, without it having been based on a sound system of participatory monitoring throughout the project intervention, the evaluation in itself is limited. Thus, the first conclusion to draw is that monitoring and evaluation should be made a systematic feature of all interventions, seeking community participation from the outset in defining what should be monitored (indicators); how often and by whom the monitoring should be conducted; how this information will be used, etc.

Document unexpected or negative outcomes carefully

In a number of cases, participants voice only positive outcomes of the intervention. This may be partly due to a wish not to cause offence, but it may also be a genuine inability at the end of an intervention to identify more negative aspects, given a general feeling that the activities were successful. Yet, often the greatest opportunities to learn arise from unexpected findings.

Be flexible in the use of participatory tools

In a number of cases, it could be observed that the field staff/ moderator might have come with a certain idea on how to approach a PME exercise, but when they come to the field, they may find that they have to adjust their plans because more people might have come than expected, or for other reasons. It is best to conduct participatory exercises in a spirit of flexibility, whilst keeping sight of the information that is required for effective monitoring and/or evaluation.

A deliberate effort has to be made to seek out the views of women and men separately. Generally, the outcomes may be quite similar, so the overall findings are pooled as one. Sometimes differences of perspective can appear relatively minor, but it is nevertheless important that they are discussed to ensure that any underlying differences are fully explored.

Checklist for Gender Mainstreaming in Developing Action Plan, Monitoring and Evaluation

- Was it ensured that the programmes are based on women's needs and demand-driven?
- Whether women are involved in identification of field problems?
- Whether the felt needs of women are taken into consideration in project planning and implementation?
- Whether women are involved in preparation of action plan?
- Whether women's involvement in prioritizing the project activities was ensured?
- Whether the social consequences expected out of the women's involvement in project implementation are thought of in the project planning process?
- Mutual trust and rapport between project team and women in watersheds is developed or not?
- Whether the time schedule as preferred by women is maintained?
- Selection of convenient place for women's participation?
- Whether women's voices are encouraged in group meetings and avoiding criticisms?
- Helping men and women to understand the value of resources?
- Whether the women's traditional knowledge of resource management is made use of?
- Have gender-disaggregated data been collected and considered in project planning?
- Whether equitable sharing of benefits ensured?
- Was it ascertained that the programmes will contribute towards empowerment of women?
- Does the programme provide visibility and recognition to women?
- Will there be any restrictions or limitations, imposed on women by the programmes?
- Have sex-disaggregated data and indicators been collected or compiled to monitor the process and outcome of the programme?
- Is there a designated person or team responsible for monitoring the programme from the gender angle?
- Have relevant staff responsible for the project been briefed or given training on gender issues?
- Does the programme leads to policy development for gender mainstreaming?
- Is the budget for the programme, gender responsive (GRB-Gender Responsive Budget)?

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TRAINING MODULE

CONTENTS

PART – A

ORGANIZATION OF THE MODULE

I. Introduction

The transmission of gender role from generation to generation in Indian society and its traditional norms guide the value judgment / decisions of development functionaries in formulation and implementation of development projects. Most of the projects fall short of addressing the specific needs and problems of men and women. The equity in gender development which is cardinal for overall development of the Nation warrants that women's needs and problems should get priority. This can be achieved by developing competency of the extension functionaries of agriculture and allied sectors in undertaking gender perspective activities to address the gender concerns and to ensure gender mainstreaming.

II. Objectives

- To assess the knowledge and skill requirement of watershed management teams for gender mainstreaming
- To impart knowledge and skill to watershed management teams in the areas of gender mainstreaming
- Impact assessment of interventions and evaluation studies

III. Course Outline

- Gender Mainstreaming: Need, Justification and Processes
- Addressing Social and Gender Issues in Watersheds
- Gender Analysis for Micro-level Planning
- Gender Disaggregated Data and its Implications for Gender Mainstreaming
- Entrepreneurial Opportunities and Market Linkages for Women SHGs
- Gender-friendly Agricultural Technologies
- Issues and Opportunities in Livestock based Enterprises for Farm Women
- Entrepreneurial Opportunities for Women in Horticulture
- Occupational Health Hazards, Drudgery of Farm Women and Mitigation Methods
- Opportunities in Fisheries based Enterprises for Women in Watersheds
- Policies and Programmes for Women Empowerment
- Social Security Schemes for Women in Watershed Areas
- Value Addition of Horticultural Products
- Developing Action Plan, Monitoring and Evaluation of Gender Mainstreaming in Watersheds

IV. Faculty

Faculty for the course includes scientists of ICAR-CIWA who have expertise in handling gender sensitive projects in agriculture. Besides, few special lectures will be arranged on addressing social and gender issues by eminent scientists of other ICAR institutes.

V. Targeted Audience

Watershed Management Teams (Social) working in the field of women empowerment and agriculture will be the participants. The total number of participants are 100 in four batches.

VI. Design of the module

The programme is of three days duration meant to cover the following subject areas;

- Gender Mainstreaming: Need, Justification and Processes
- Addressing Social and Gender Issues in Watersheds
- Gender Analysis for Micro-level Planning
- Gender Disaggregated Data and its Implications for Gender Mainstreaming
- Entrepreneurial Opportunities and Market Linkages for Women SHGs
- Gender-friendly Agricultural Technologies
- Issues and Opportunities in Livestock based Enterprises for Farm Women
- Entrepreneurial Opportunities for Women in Horticulture
- Occupational Health Hazards, Drudgery of Farm Women and Mitigation Methods
- Opportunities in Fisheries based Enterprises for Women in Watersheds
- Policies and Programmes for Women Empowerment
- Social Security Schemes for Women in Watershed Areas
- Value Addition of Horticultural Products
- Developing Action Plan for Gender Mainstreaming in Watersheds

VII. Logistic Support

(a) **Residential Arrangement:** Accommodation will be provided in double bedded rooms and dormitories in ICAR-CIWA trainees hostel with boarding facilities.

(b) **Physical Facilities:** The venue is ICAR-CIWA, with adequate infrastructural facilities and audio-visual aids.

(c) **Training materials:** Day-wise detailed training schedule, reading materials/ tools etc. will be provided during the sessions, and on the concluding day, training manual /compendium will be distributed.

VIII. Evaluation

Evaluation will be done with the use of three questionnaires (Proforma for training need assessment, format for pre-training and post-training evaluation-Annexure I, II and III).

PROGRAMME SCHEDULE

Date/ Day	10:15-11:30 Hrs		11:45-13:00 Hrs	14:15-15:30 Hrs	15:45-17:00 Hrs
Day 1	Registration/ Inauguration/ Pre-training Evaluation (09:30-10:30)	Gender Mainstreaming: Need, Justification and Processes (Dr. Neelam Grewal)	Addressing Social and Gender Issues in Watersheds (Dr. B.N. Sadangi)	Gender Analysis for Micro-level Planning (Dr. Sabita Mishra)	Gender Disaggregated Data and its Implications for Gender Mainstreaming (Dr. Ananta Sarkar)
Day 2	Issues and Opportunities in Livestock based Enterprises for Farm Women (Dr. Anil Kumar)		Gender-friendly Agricultural Technologies (Dr. S. K. Srivastava)	Entrepreneurial Opportunities for Women in Horticulture (Dr. Naresh Babu)	Opportunities in Fisheries based Enterprises for Women in Watersheds (Mrs. Tanuja, S.) / Policies and Programmes for Women Empowerment (Dr. Kushagra Joshi)
Day 3	Entrepreneurial Opportunities and Market Linkages for Women SHGs (Dr. H.K. Dash)		Occupational Health Hazards, Drudgery of Farm Women and Mitigation Methods (Dr. Jyoti Nayak)	Social Security Schemes for Women in Watershed Areas (Ms. Gayatri Moharana)	Developing Action Plan, Monitoring and Evaluation of Gender Mainstreaming in Watersheds (Dr. J. C. Jeeva) / Post-training Evaluation & Valedictory Session (16:30-17:30)

Recapitulation (09:45-10:15 Hrs)

Tea Break (11:30-11:45 Hrs)

Lunch Break (13:00-14:15 Hrs)

Tea Break (15:30-15:45 Hrs)

DAY ONE (9.30 AM - 5.00 PM)

Session	Topic
1 2 3 4 5 6 7	Registration/ Inauguration De-freezing Pre-training Evaluation Gender Mainstreaming: Need, Justification and Processes Addressing Social and Gender Issues in Watersheds Gender Analysis for Micro-level Planning Gender Disaggregated Data and its Implications for Gender Mainstreaming

Day One Session 1 : Inaugural Session	
Time duration	Half an hour (9.30 am – 10.00 am)
Learning goal	Setting the tone of programme
Methods	- Registration and distribution of training kits - Brief welcome, presidential address, key note speech, remarks about course
Session 2 : De-freezing	
Time duration	Half an hour (10.00 am – 10.30 am)
Learning goal	- Breaking ice / unfreezing the participants - Breaking communication barriers with brief introduction among themselves - Sharing experiences and views - Setting training goals and modus operandi
Learning materials/methods	- Self introduction - Introducing each other (between two) - Informal interaction
Physical setting	Sitting in semi-circular way, white board, colour cards, sketch pens, marker pens, chart papers
Procedure	Directions and briefing by the facilitators-Annexure IV
Session 3 : Training Need Assessment and Pre-training Evaluation	
Time duration	Half an hour (10.30 am – 11.00 am)
Learning goal	To identify the training needs and knowledge level of the participants on gender mainstreaming
Learning materials/methods	-Individuals fill up of format on training need assessment -Individual fill up of format on pre-training evaluation
Procedure	Briefing by facilitators –Individual format fill up – summarization and presentation of needs of participants by the facilitator
Reading/ reference materials	Pre-tested and structured questionnaires-Annexure I and II

Session 4: Gender Mainstreaming: Need, Justification and Processes	
Time duration	One hour (11.15 am – 12.15 noon)
Learning goal	Awareness, knowledge creation and sensitization on Gender Mainstreaming; Need, justification and processes; Gender issues in agriculture; Women-friendly technologies
Learning materials/ methods	Formal lecture presentation and interaction
Reading /reference materials	Printed reading materials
Session 5 : Addressing Social and Gender Issues in Watersheds	
Time duration	One hour (12.15 noon-13.15 pm)
Learning goal	➢ Awareness, knowledge creation and sensitization on addressing social and gender issues in watersheds ➢ To make the participants aware of status of women in India. To help participants to know the social differences between the women and men in society.
Learning materials/methods	Formal lecture presentation and interaction
Reading /reference materials	Printed reading materials
Session 6 : Gender Analysis for Micro-level Planning	
Time duration	One hour 15 minutes (14.15 pm-15.30 pm)
Learning goal	➢ Awareness, knowledge creation and sensitization on gender analysis for micro-level planning in watersheds. ➢ Introduction to various tools of gender analysis. ➢ To make the participants equipped for implementation of gender analysis tools in the field.
Learning materials/methods	Formal lecture presentation and interaction. Small group formation, discussion, chart preparation, presentation and interaction. Dummy exercise with gender analysis by the small groups. Group exercise and report presentation
Physical setting	Small groups consisting of 5/6. Sitting in circular seating arrangements. Chart papers, marker pens and colour papers.
Procedure	Divide participants into small groups Explain each tool in detail Practicing the tools as dummy exercise
Reading /reference materials	Printed reading materials. Tools for field studies.
Session 7 : Gender Disaggregated Data and its Implications for Gender Mainstreaming	
Time duration	One hour 15 minutes (15.45 pm-17.00 pm)
Learning goal	Awareness, knowledge creation and sensitization on

	gender disaggregated data and its implications for gender mainstreaming; Sources of gender disaggregated data; Statistical tools for gender analysis
Learning materials/methods	Formal lecture presentation and interaction Brain storming regarding gender disaggregated data Group discussion and interaction
Reading /reference materials	Printed reading materials

DAY TWO (9.30 am- 5.00 pm)

Session	Topic
1	Re-capitulation of Previous Day's Learning
2	Issues and Opportunities in Livestock based Enterprises for Farm Women
3	Gender-friendly Agricultural Technologies
4	Entrepreneurial Opportunities for Women in Horticulture
5	Opportunities in Fisheries based Enterprises for Women in Watersheds
6	Policies and Programmes for Women Empowerment

Day Two Session-1: Re-capitulation of Previous Day's Learning	
Time duration	Half an hour (9.30 am – 10.00 am)
Learning goal	Reviewing the previous day's learning
Learning materials/methods	Group discussion and interaction
Physical setting	Semi-circular sitting arrangement Chart papers and marker pens
Procedure	The participants need to be asked about previous day's learning, the most interesting session and the need for any change in approaches.
Reading /reference materials	Need based literatures
Session 2 : Issues and Opportunities in Livestock based Enterprises for Farm Women	
Time duration	One hour 15 minutes (10.00 am- 11.15 am)
Learning goal	Awareness and knowledge creation on Issues and Opportunities in Livestock based Enterprises for Farm Women; Status of livestock in India; Identifying regional gender issues and gender analysis in livestock production;.
Learning materials/methods	Lecture, presentation of case studies Group discussion
Reading /reference materials	Hand-outs and printed reading materials
Session 3 : Gender-friendly Agricultural Technologies	
Time duration	One hour 15 minutes (11.30 am-13.00 pm)
Learning goal	Awareness and knowledge creation on gender-friendly agricultural technologies with specific reference to crop protection; To identify the

	involvement of women in home and farm, and the gender issues in ecology based pest management
Learning materials/methods	Lecture and Group discussion
Reading /reference materials	Hand-outs and printed reading materials
Session 4 : Entrepreneurial Opportunities for Women in Horticulture	
Time duration	One hour 15 minutes (14.00 pm - 15.15 pm)
Learning goal	Creating awareness on entrepreneurial opportunities for women in horticulture; production of quality planting materials; protected cultivation of vegetables; floriculture; value addition etc.
Learning materials/methods	Lecture, presentation of case studies Group discussion Case analysis of rural families having horticultural production system
Reading /reference materials	Hand-outs and related literature
Session 5 : Opportunities in Fisheries based Enterprises for Women in Watersheds	
Time duration	One hour (15.15 pm - 16.15 pm)
Learning goal	Creating awareness on opportunities in aquaculture, harvest and post harvest fisheries based enterprises for women in watersheds
Learning materials/methods	Lecture with power point presentation Group discussion
Reading /reference materials	Hand-outs
Session 6 : Policies and Programmes for Women Empowerment	
Time duration	One hour (16.15 pm - 17.15 pm)
Learning goal	Sensitization on plans and policies for women empowerment; indicators for women empowerment and gender equity; women empowerment articles of Indian constitution
Learning materials/methods	Lecture with power point presentation Group discussion
Reading /reference materials	Hand –outs

DAY THREE (9.30 am- 5.00 pm)

Session	Topic
1	Recapitulation of Previous Day's Learning
2	Entrepreneurial Opportunities and Market Linkages for Women SHGs
3	Occupational Health Hazards, Drudgery of Farm Women and Mitigation Methods
4	Social Security Schemes for Women in Watershed Areas
5	Developing Action Plan, Monitoring and Evaluation of Gender Mainstreaming in Watersheds
6	Post-training Evaluation
7	Valedictory Session

Day Three Session-1: **Re-capitulation of Previous Day's Learning**	
Time duration	Half an hour (9.30 am – 10.00 am)
Learning goal	Reviewing the previous day's learning
Learning materials/methods	Group discussion and interaction
Physical setting	Semi-circular sitting arrangement Chart papers and marker pens
Procedure	The participants need to be asked about previous day's learning, the most interesting session and the need for any change in approaches.
Reading /reference materials	Need based literatures
Session 2 : Entrepreneurial Opportunities and Market Linkages for Women SHGs	
Time duration	One hour (10.00 am-11.00 am)
Learning goal	To make the participants to understand the entrepreneurial opportunities and market linkages for women SHGs
Learning materials/methods	Formal lecture Brainstorming and interaction
Reading /reference materials	Hand-outs and related literature
Session 3: Occupational Health Hazards, Drudgery of Farm Women and Mitigation Methods	
Time duration	One hour (11.00 am- 12.00 pm)
Learning goal	Awareness and knowledge creation on occupational health hazards, drudgery of farm women and mitigation methods; practices of farm women in different farm operations
Learning materials/methods	Lecture with power point presentation Field exposure Group discussion
Reading /reference materials	Printed literature
Session 4 : Social Security Schemes for Women in Watershed Areas	
Time duration	One hour (12.00 pm-13.00 pm)
Learning goal	Awareness, knowledge creation and sensitization on social security schemes for women in watershed areas
Learning materials/methods	Formal lecture presentation and interaction
Reading /reference materials	Printed reading materials.
Session 5 : Developing Action Plan, Monitoring and Evaluation of Gender Mainstreaming in Watersheds	
Time duration	One hour 15 minutes (14.15 pm-15.30 pm)
Learning goal	Awareness, knowledge creation on developing action plan, monitoring and evaluation; Introduction to various tools of participatory monitoring and evaluation; To make the participants able to formulate projects on gender perspective.

Learning materials/methods	Formal lecture presentation and interaction. Small group formation, discussion, chart preparation, presentation and interaction. Dummy exercise by the small groups. Group exercise and report presentation. Facilitator to help the group in preparing action plan.
Physical setting	Small groups consisting of 5/6 Sitting in semi-circular seating arrangements. Chart papers, marker pens and colour papers
Procedure	Divide participants into small groups Explain the tools Practicing the tools as dummy exercise
Reading /reference materials	Printed reading materials. Tools for field studies.
Session 6 : Post-training Evaluation	
Time duration	Half an hour (16.00 pm - 16.30 pm)
Learning goal	Getting feed back and suggestions from the participants about the training programme for further improvement
Learning materials/methods	Filling up of evaluation formats Group interaction and discussion
Physical setting	Semi-circular sitting Formats
Procedure	Participants to fill up formats Facilitator to explain the format
Reading /reference materials	Evaluation format : Annexure III
Session 7 : Valedictory Session	
Time duration	One hour (4.30 pm - 5.30 pm)
Programme	Address by the Chief Guest Remarks and feedback from the participants Evaluation report presentation Distribution of certificates Thanks giving Distribution of Course Compendiums
Physical setting	Sitting in a formal way

PART B

Annexure I	**Questionnaire for Pre-project Diagnostic Studies on Need Assessment**

भा.कृ.अनु.प. - केन्द्रीय कृषिरत महिला संस्थान, भुवनेश्वर

ICAR - CENTRAL INSTITUTE FOR WOMEN IN AGRICULTURE
(ISO 9001:2008 Certified)
Plot No.50-51, Mouza-Jokalandi, Post-Baramunda, Bhubaneswar – 751 003, Odisha

Capacity Building cum Skill Upgradation on
"Gender Mainstreaming in Integrated Watershed Management Programme"
(Questionnaire for Pre-project Diagnostic Study among Watershed Management Teams)

A. Socio-personal profile

A01. Name of the Official :
A02. Designation :
A03. Organizational address for communication :
A04. Age (in completed years) :
A05. Gender : Male/ Female
A06. Educational qualification :
A07. Area of specialization :
A08. Rural/ urban background : Rural/ Urban
A09. Professional experience (in years) : ____.

A10. Please indicate your present roles and responsibilities in the format given below:

Sl. No.	**Roles and responsibilities**	**Time spent (in %)**
1.		
2.		
Core Areas in Gender Perspective		
4.		
5.		

A11. In-service training undergone- Please furnish the information on number of gender based training programmes undergone in the last 5 years:

Total Number:_____

Sl. No.	**Name of the training programme**	**Duration**	**Organized by**	**Impact realized/ benefits accrued from the programme**
1.				
2.				

A12. Communication behaviour: Kindly give the details of your use of the following sources for gathering/dissemination of information related to watersheds by putting a tick mark (√).

Sl. No.	Source	Frequency of use		
		Regularly	Occasionally	Rarely
I Formal source				
1.	Researchers			
2.	Extension personnel			
3.	NGO officials			
	Others (specify)			
II Informal source				
1.	Farm women			
2.	Progressive farmers			
3.	Local leaders			
	Others (specify)			
III Mass media sources				
1.	Radio			
2.	Television			
3.	Newspaper			
4.	Journals/ Magazines			
5.	Printed bulletins (Folders/ pamphlets etc.)			
6.	CDs/ Internet			
	Others (specify)			

A13. Extension methods used/ modes of implementing the job responsibilities for gender mainstreaming in watersheds: Please give your response by putting a tick mark (√) :

Sl. No.	Methods	Extent of Use		
		Fully	Partially	Never
1.	Individual contact methods-personal calls and personal visits			
2.	Training programmes/ workshops/ seminars			
3.	Field days/ farmers days/ field visits/ study tours			
4.	Organizing exhibitions			
5.	Use of folk media			
6.	Radio talks			
7.	TV programmes			
8.	Printed literature/ print media			
9.	Information & Communication Technology (ICT) based approaches			
10.	Field level demonstrations			
11.	Village adoption programmes			
12.	Consultancy services			
	Others (please specify)			

B. GENDER MAINSTREAMING IN WATERSHEDS

B1. Gender-specific programmes in watersheds: Please indicate the number of programmes conducted with gender perspective and beneficiaries covered, during the last year (2013-14)

Sl. No.	Name of the programme conducted in gender perspective	No. of programmes conducted	No. of beneficiaries	
			Men	Women
1.				
2.				
3.				

B2. Process of gender mainstreaming: Please indicate your extent of adoption the following measures for ensuring women's participation in watershed development programmes

Sl. No.	Measures for women's participation	Extent of adoption		
		Fully adopted	Partially adopted	Not adopted
B2A. Programme planning phase				
1.	Ensuring that the programmes are based on women's needs and demand-driven			
2.	Involving women in identification of field problems			
3.	Felt needs of women are taken into consideration in project planning and implementation			
4.	Women are involved in preparation of action plan			
5.	Ensuring women's involvement in prioritizing the project activities			
6.	Information dissemination well in time			
7.	Social consequences expected out of the women's involvement in project implementation are thought of in the project planning process			
	Any others (Please, specify):			
B2B. Social dimensions				
1.	Developing mutual trust and rapport between project team and women in watersheds			
2.	Maintaining the time schedule as preferred by women			
3.	Selection of convenient place for women's participation			
4.	Women's voices are encouraged in group meetings and avoiding criticisms			

Sl. No.	Measures for women's participation	Extent of adoption		
		Fully adopted	Partially adopted	Not adopted
5.	Including measures to avoid conflicts among men and women or among women, due to social strata			
6.	Helping men and women to understand the value of resources			
7.	Including women in the resource management committees			
8.	Ensuring gender equality in access to project resources			
9.	Ensuring the right to resource use for indigenous women			
10.	Sensitizing the agencies of watershed programmes about the needs and constraints of women			
	Any others (Please, specify):			
B2C. Technological dimensions				
1.	Regular awareness creation among women on the avenues for livelihood in watersheds			
2.	Constant technical guidance are given to women			
3.	Training women in required components			
4.	Making use of women's traditional knowledge of resource management			
5.	Looking for ways in which inputs and new technologies can be channeled effectively to reach women			
6.	Use of appropriate communication channels			
7.	Proper documentation of feedback from women			
	Any others (Please, specify):			
B2D. Others, if any: Any other special efforts to ensure women's participation				

B3. Livelihood issues in watersheds: Kindly list out the three most important livelihood issues impacting women in watersheds as perceived by you.

1.
2.
3.

B4. Perception on women's participation in watershed development: Listed below are the statements that speak about your perception on women's participation in watershed management/ development. Please indicate your degree of agreement/ disagreement with the following statements by putting a tick (✓) mark in the appropriate column against each statement.

Sl. No.	Items	SA	A	UD	DA	SDA
1.	Level of women's involvement in watershed activities is satisfactory					
2.	The watershed management project imposes an extra burden on women's workday					
3.	The watershed management project imposes an extra burden on women's workday, but will benefit women					
4.	There are social constraints in women collecting resources from watersheds					
5.	Men and women have equal access to project resources, which ensures their participation					
6.	Cooperation exists among men and women in implementation of the programmes					
7.	Watershed management project changes indigenous women's and men's land use rights					
8.	Women's preferences in prioritizing the watershed activities are facilitated					

(SA= Strongly Agree; A= Agree; UD= Undecided; DA= Disagree; SDA= Strongly Disagree)

B5. Gender issues in watershed management: Kindly list out the most three important gender issues in watershed management as perceived by you (Time, Financial and Social Constraints on the participation of women in watershed activities).

1.

2.

3.

B6. Attitude towards Gender Mainstreaming in Watersheds: Listed below are the statements that speak about your **Attitude towards Gender Mainstreaming in Watersheds**. Please indicate your degree of agreement/ disagreement with the following statements by putting a tick (✓) mark in the appropriate column against each statement.

Sl. No.	Items	SA	A	UD	DA	SDA
1.	The watershed development process should start with the survey of women's knowledge, attitude, practices and resource availability					
2.	It need to be ensured that the watershed development programmes are compatible with the situation, value system and the norms of the women's society					
3.	Management abilities and resource base of the women should be taken into consideration in the watershed development process					
4.	Getting regular feedback from the women group can improve the watershed development programmes					
5.	Field problems expressed as feedback by women need not be identified, as organizational priority areas have already been identified					
6.	Women's involvement at the various stages of watershed project implementation is a complex issue					
7.	Participation of women at all stages of the project is not the ideal situation					
8.	Women farmers can create new ventures/ enterprises in watersheds					
9.	Women's role is significant in conservation of natural resources					

(SA= Strongly Agree; A= Agree; UD= Undecided; DA= Disagree; SDA= Strongly Disagree)

B7. Gender Mainstreaming Checklist: Please indicate your response to the following checklist by putting a tick (✓) mark in the appropriate column against each statement.

Sl. No.	Gender Mainstreaming Checklist	Yes	No	Not applicable
1.	Have gender-disaggregated data been collected and considered in project planning and implementation?			
2.	Has any of the following been consulted about the gender impact of the programmes (Gender specialists such as Women's Commission, gender			

Sl. No.	Gender Mainstreaming Checklist	Yes	No	Not applicable
	research centres, individual gender experts, relevant government bureau or departments etc.)?			
3.	Have specific needs of women and men been identified, considered and integrated in designing the programmes?			
4.	Have resources been allocated to address the identified needs of women?			
5.	Was it ascertained that the programmes promote the elimination of discrimination of women?			
6.	Was it ascertained that the programmes will establish legal and other protection of the rights of women?			
7.	Was it ascertained that the programmes will strengthen women's decision-making role?			
8.	Does the programme facilitates leadership development among women?			
9.	Was it ascertained that the programmes will increase women's access to and control over the resources?			
10.	Does the programme increase the access of women to agricultural information and extension services?			
11.	Whether equitable sharing of benefits ensured?			
12.	Was it ascertained that the programmes will contribute towards empowerment of women?			
13.	Does the programme provide visibility and recognition to women?			
14.	Does the programme address poverty and unemployment of women?			
15.	Does the programme address health and nutrition of women?			
16.	Are there institutional mechanism to address the gender concerns?			
17.	Does the programme increase the access of women to agricultural information and extension services?			
18.	Whether equitable sharing of benefits ensured?			
19.	Will there be any restrictions or limitations, imposed on women by the programmes?			
20.	Has the promotional contents of the project (printed materials, folders, mass media) are presented in a gender-sensitive manner?			
21.	Is the medium of promotion (e.g. venues, channels or time slots) effective in reaching the target			

Sl. No.	Gender Mainstreaming Checklist	Yes	No	Not applicable
	women group?			
22.	Is gender sensitive language used throughout the programme, or in the related official documents?			
23.	Have women been affected differently from men during the implementation process, e.g. eligibility, level of benefits, accessibility, or availability of support facilities?			
24.	Have there been any special measures to address women's needs during the implementation process? If yes, please mention: i. ii.			
25.	Have sex-disaggregated data and indicators (qualitative or quantitative) been collected or compiled to monitor the process and outcome of the programme?			
26.	Have gender perspectives and concerns been included in the monitoring mechanism?			
27.	Is there a designated person or team responsible for monitoring the programme from the gender angle?			
28.	Have relevant staff responsible for the project been briefed or given training on gender issues?			
29.	Has gender sensitivity been included as one of the attributes in the staff appraisal or other feedback system?			
30.	Does the programme leads to policy development for gender mainstreaming?			
31.	Is the budget for the programme, gender responsive (GRB-Gender Responsive Budget)?			

C. Assessment of Skills in Gender Mainstreaming: Please indicate your skill level in gender mainstreaming by marking a tick (✓) under the appropriate category.

Sl. No.	Gender Mainstreaming Skills	Perceived Skill Level		
		Good	Fair	Poor
1.	Collection of gender disaggregated data			
2.	Use of gender analysis tools			
3.	Identification of gender sensitization methods			
4.	Rapport building with women			
5.	Communication skills			
6.	Identifying gender needs			
7.	Organizing field level meetings			

Sl. No.	Gender Mainstreaming Skills	Perceived Skill Level		
		Good	Fair	Poor
8.	Formation of women SHGs			
9.	Recognizing successful women			
10.	Maintenance of cohesiveness			
11.	Preparation of action plan involving women			
12.	Leadership development among women			
13.	Assessment of training needs of women			
14.	Conducting training programmes for women			
15.	Conducting field demonstrations for women			
16.	Organizing sensitization programmes			
17.	Use of revolving fund			
18.	Identification of gender-sensitive farm technologies			
19.	Facilitating market linkages for women SHGs			
20.	Monitoring and evaluation			

D. Training Needs: Please indicate any three most important training needs on the subject areas for gender mainstreaming in Integrated Watershed Management Programme:

1.
2.
3.

E. Constraints: Kindly mention the constraints faced by you in performing your job responsibilities by putting a tick (✓) mark.

1. Lack of adequate field staff
2. Inadequacy of financial resources
3. Lack of proper feedback from the clients
4. Lack of participation of clients
5. Administrative constraints
6. Lack of conducive working climate
7. Lack of infrastructural facilities
8. Lack of transport facilities
9. Lack of autonomy
10. Lack of promotion opportunities
11. Inadequate pay for the job
12. Lack of rewards and recognition
13. Lack of training exposure
14. Communication problems
15. Stress
16. Non-availability of time
17. Any others (Please, specify). _____

F. Suggestions: Kindly suggest your perceived ways and means to improve your work efficiency for gender mainstreaming in watersheds

1. _____
2. _____

G. Extent of Awareness and Knowledge: Please indicate your extent of awareness and knowledge level on the following subject areas relating to gender mainstreaming by marking a tick (✓) under the appropriate category.

Sl. No.	Subject Areas	Extent of Awareness			Perceived Knowledge Level		
		Fully aware	Partially aware	Not aware	Good	Fair	Poor
1.	Need for gender mainstreaming						
2.	Processes of gender mainstreaming						
3.	Social issues in watersheds						
4.	Gender issues in watersheds						
5.	Role of women in watershed management						
6.	Gender analysis tools for micro-level planning						
7.	Gender disaggregated data in watershed						
8.	Implications of gender disaggregated data for gender mainstreaming						
9.	Social security schemes for women in watershed Areas						
10.	Role of women in family food security in watershed areas						
11.	Gender-friendly agricultural technologies						
12.	Opportunities in livestock based enterprises for women in watersheds						
13.	Opportunities in horticulture based enterprises for women in watersheds						
14.	Opportunities in fisheries based enterprises for women in watersheds						
15.	Entrepreneurial opportunities for women in watershed areas						
16.	Avenues for livelihood of women in watersheds						
17.	Role of women in natural resource management						
18.	Occupational health hazards of women						
19.	Drudgery of farm women in watersheds						
20.	Women friendly technologies for drudgery reduction						
21.	Developing action plan for gender mainstreaming in watersheds						
22.	Policies and programmes for empowerment of women						
	Any other subject areas (Please, specify)						

Annexure II	Pre-training Evaluation

PRE-TRAINING EVALUATION SCHEDULE

(The pre-test is not used for grading the trainees.
It is used for finding ways to improve the institutional programmes)

Sl.No. _____
Date _____

1. Name of the participant :
2. Position in the organization :
3. Age (in years) :
4. Academic qualification :
5. Total years of experience in the job :
6. Have you undergone courses in gender analysis at :
   (a) Under-graduate level - Yes/No
   (b) Post-graduate level - Yes/No
7. (a) Are you involved in the women empowerment programmes / services? Yes/No
   (b) If yes, please indicate your job responsibilities with gender perspective
   i)
   ii)
8. Do you have any knowledge about various concepts on gender?

Key Concepts	Perceived Level of Knowledge				Source of Knowledge
	Not Heard	Heard	Definition Known	Implication understood	
Gender					
Gender Role					
Gender Issues					
Gender Sensitization					
Gender Mainstreaming					
Women Empowerment					

9. Please indicate your perceived knowledge level against the items listed in table below.

Sl. No.	Items	Perceived Knowledge Level				
		Nil	Poor	Fair	Good	Excellent
1.	Need for gender mainstreaming					
2.	Processes of gender mainstreaming					
3.	Social issues in watersheds					
4.	Gender issues in watersheds					
5.	Role of women in watershed management					
6.	Gender analysis tools for micro-					

Sl. No.	Items	Perceived Knowledge Level				
		Nil	Poor	Fair	Good	Excellent
	level planning					
7.	Gender disaggregated data in watershed					
8.	Implications of gender disaggregated data for gender mainstreaming					
9.	Social security schemes for women in watershed Areas					
10	Role of women in family food security in watershed areas					
11.	Gender-friendly agricultural technologies					
12.	Opportunities in livestock based enterprises for women in watersheds					
13.	Opportunities in horticulture based enterprises for women in watersheds					
14.	Opportunities in fisheries based enterprises for women in watersheds					
15.	Entrepreneurial opportunities for women in watershed areas					
16.	Avenues for livelihood of women in watersheds					
17.	Role of women in natural resource management					
18.	Occupational health hazards of women					
19.	Drudgery of farm women in watersheds					
20.	Women friendly technologies for drudgery reduction					
21.	Developing action plan for gender mainstreaming in watersheds					
22.	Policies and programmes for empowerment of women					

10. Besides your interest in training, do you have any other reasons of coming over here:
(i)
(ii)
(iii)

Annexure III	Post-training Evaluation Proforma

POST-TRAINING EVALUATION SCHEDULE

(The post-training test is not used for grading the trainees.
It is used for finding ways to improve the institutional programmes)

Sl.No. _____
Date _____

1. Name :
2. Designation :
3. Age :
4. Department/place of posting :
5. Educational Qualification :
6. Year of professional experience :
7. Please indicate your level of satisfaction in attending this programme by putting tick mark (✓) in the appropriate column.

Sl. No.	Item	Highly satisfied	Partially satisfied	Partially dissatisfied	Dissatisfied	Highly dissatisfied
1.	How satisfied are you with the training to help you in performing your job?					
2.	How satisfied are you with the general arrangement of the training?					
3.	How satisfied are you with the available physical facilities for the training?					
4.	How satisfied are you with your participation in planning programme in future?					
5.	How satisfied are you with the teaching skill of your facilitators?					

8. Given below are list of topics covered in the training. Please indicate the extent of coverage and usefulness by putting tick mark (✓) in the appropriate column.

EXTENT OF COVERAGE			LIST OF TOPICS	EXTENT OF USEFULNESS		
Well covered	Moderately covered	Poorly covered		Most useful	Useful	Not useful
1	2	3	4	5	6	7
			Need for gender mainstreaming			
			Processes of gender mainstreaming			
			Social issues in watersheds			
			Gender issues in watersheds			
			Role of women in watershed management			
			Gender analysis tools for micro-level planning			
			Gender disaggregated data in watershed			
			Implications of gender disaggregated data for gender mainstreaming			
			Social security schemes for women in watershed Areas			
			Role of women in family food security in watershed areas			
			Opportunities in livestock based enterprises for women in watersheds			
			Opportunities in horticulture based enterprises for women in watersheds			
			Opportunities in fisheries based enterprises for women in watersheds			
			Entrepreneurial opportunities for women in watershed areas			
			Policies and programmes for empowerment of women in watersheds			
			Role of women in natural resource management			
			Occupational health hazards of women			
			Drudgery of farm women in watersheds			
			Women friendly technologies for drudgery reduction			
			Developing action plan for gender mainstreaming in watersheds			

9. To what extent, your expectations of the course have been fulfilled (to the great extent/ to some extent/ to a little extent). Briefly substantiate your response:

---

10. Comments on Training Atmosphere and Methodology: Please indicate your level of satisfaction on training atmosphere and methodology by putting tick mark (✓) in the appropriate column.

Sl. No.	Item	Degree of Satisfaction		
		Fully Satisfied	Partially Satisfied	Not at all Satisfied
1.	Atmosphere to exchange ideas freely with faculty members			
2.	Medium of instruction			
3.	Training methods			
4.	Use of audio-visual aids			
5.	Timely information of day-to-day activities			
6.	Relevance of course contents			
7.	Adequacy of contents			
8.	Practical orientation			
9.	Any other (please, specify)			

11. Were you satisfied with the duration of the training? Yes/No
If not, kindly suggest the optimum duration._____

12. How was the daily programme? Tick the appropriate one
(a) Very tight (b) Tight (c) Comfortable (d) Light (e) Very light

13. List out any three major learning in the order of priority
i.....
ii.....
iii.....

14. List out any three new skills acquired during the programme
i.....
ii.....
iii.....

15. Do you feel that the learning of the course will help you in improving your job performance. If yes, how?
i.....
ii.....
iii.....

16. Opinions about boarding, lodging and transportation facilities.

17. What is your overall opinion about the training programme?

18. Please offer your suggestions for improving the future programmes.

Annexure IV	De-freezing Method

DE-FREEZING

Learning goals:

- To create a friendly environment by de-freezing the participants.
- To break communication barriers among each other to share experiences and ideas.
- To set the goals and the rules of training.

Exercise – I	1 hour
Method	Introduction through pairs
Application	The participants will be grouped into various pairs and will collect information as much as possible from each other. Then each pair will introduce each other for two minutes before the audience.
Exercise - II	30 minutes
Method	Small group exercise
Application	Total group will be divided into small groups consisting of five members. Each group has to discuss their expectations about training and present in a sheet. The Course Director should summarize the group expectations in an informal way.

xxx