

Vision 2050

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शरद पवार
SHARAD PAWAR



कृषि एवं खाद्य प्रसंस्करण उद्योग मंत्री
भारत सरकार
MINISTER OF AGRICULTURE &
FOOD PROCESSING INDUSTRIES
GOVERNMENT OF INDIA

Dated the 13th June 2013



MESSAGE

The scientific and technological inputs have been major drivers of growth and development in agriculture and allied sectors that have enabled us to achieve self reliant food security with a reasonable degree of resilience even in times of natural calamities, in recent years. In the present times, agricultural development is faced with several challenges relating to state of natural resources, climate change, fragmentation and diversion of agricultural land to non-agricultural uses, factor productivity, global trade and IPR regime. Some of these developments are taking place at much faster pace than ever before. In order to address these changes impacting agriculture and to remain globally competent, it is essential that our R&D institutions are able to foresee the challenges and formulate prioritized research programmes so that our agriculture is not constrained for want of technological interventions. It is a pleasure to see that Directorate of Research on Women in Agriculture (DRWA), Bhubaneswar, a constituent institution of the Indian Council of Agricultural Research (ICAR) has prepared Vision-2050 document. The document embodies a pragmatic assessment of the agricultural production and food demand scenario by the year 2050. Taking due cognizance of the rapidly evolving national and international agriculture, the institute, has drawn up its Strategic Framework, clearly identifying Goals and Approach.

I wish DRWA all success in realization of the Vision-2050.

(SHARAD PAWAR)

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FOREWORD

The Indian Council of Agricultural Research, since inception in the year 1929, is spearheading science and technology led development in agriculture in the country. This is being accomplished through agricultural research, higher education and frontline extension undertaken by a network of research institutes, agricultural universities and Krishi Vigyan Kendras. Besides developing and disseminating new technologies, ICAR has also been developing competent human resources to address the present and future requirements of agriculture in the country. Committed and dedicated efforts of ICAR have led to appreciable enhancement in productivity and production of different crops and commodities, which has enabled the country to raise food production at a faster rate than the growth in demand. This has enabled the country to become self-sufficient in food and emerge as a net food exporter. However, agriculture is now facing several challenges that are expected to become even more diverse and stiffer. Natural resources (both physical and biological) are deteriorating and getting depleted; risks associated with climate change are rising, new forms of biotic and abiotic stress are emerging, production is becoming more energy intensive, and biosafety concerns are growing. Intellectual property rights and trade regulations impacting technology acquisition and transfer, declining preference for farm work, shrinking farm size and changes in dietary preferences are formidable challenges.

These challenges call for a paradigm shift in our research approach to harness the potential of modern science, innovations in technology generation and delivery, and enabling policy and investment support. Some of the critical areas as genomics, molecular breeding, diagnostics and vaccines, nanotechnology, secondary agriculture, farm mechanization, energy efficiency, agri-incubators and technology dissemination need to be given priority. Multidisciplinary and multi-institutional research will be of paramount importance, given the fact that technology generation is increasingly getting knowledge and capital intensive.

It is an opportune time that the formulation of 'Vision-2050' by ICAR institutions coincides with the launch of the national 12 Five Year Plan. In this Plan period, the ICAR has proposed to take several new initiatives in research, education and frontline extension.

These include creation of consortia research platforms in key areas, wherein besides the ICAR institutions, other science and development organizations would be participating; short term and focused research project through scheme of extramural grants; Agri-Innovation fund; Agri-incubation fund and Agri-tech Foresight Centres (ATFC) for research and technology generation.

The innovative programme of the Council, 'Farmer First' (Farmer's farm, Innovations, Resources, Science and Technology) will focus on enriching knowledge and integrating technologies in the farmer's conditions through enhanced farmer-scientist interface. The 'Student READY' (Rural Entrepreneurship and Awareness Development Yojana) and 'ARYA' (Attracting and Retaining Youth in Agriculture) are aimed to make agricultural education comprehensive for enhanced entrepreneurial skills of the agricultural graduates.

I am happy to note that the Vision-2050 document of **Directorate of Research on Women in Agriculture** has been prepared, based on the assessment of present situation, trends in various factors and changes in operating environment around agriculture to visualize the agricultural scenario about 40 years hence and chalk out a demand-driven research agenda for science led development of agriculture for food, nutrition, livelihood and environmental security, with a human touch.

I am sure that the '**Vision-2050**' would be valuable in guiding our efforts in agricultural R&D to provide food and nutritional security to the billion plus population of the country for all times to come.



(S. Ayyappan)

Dated the 10th June,
2013 New Delhi

Preface

Today gender issues are a major challenge confronting Indian agriculture that have serious socio-economic implications. In the scenario of rapid structural and technological changes, it has become imperative that we understand the development perspectives of women together with that of agriculture and take measures to empower them so as to make them an important driver of sustainable development.

The Directorate of Research on Women in Agriculture, the erstwhile National Research Centre for Women in Agriculture, has consistently worked to understand the role and problems of women in agriculture and their implications for agricultural development. The Directorate has also been informing the researchers and policy makers with inputs for gender based decision making. It has envisioned the challenges and opportunities for women in agriculture and drawn up a road map in the form of Vision 2050 to strengthen gender research in agriculture and make women vibrant partners in agricultural development

I express my deep sense of gratitude to Dr. S. Ayyappan, Secretary, Department of Agricultural Research & Education and Director General, Indian Council of Agricultural Research his keen interest, encouragement and guidance in developing the Vision 2050 document. I am grateful to Dr. K.D. Kokate, Deputy Director General (AE), Indian Council of Agricultural Research, for his kind support and encouragement in bringing out this document. I am grateful to Dr. Krishna Srinath, who retired as Director, DRWA in February 2013, for her immense contribution in developing Vision 2050 document. I am highly thankful to the Chairman and the members of Research Advisory Council and Institute Management Committee for their valuable suggestions in the course of preparation of the document. I thank the scientists of DRWA who have contributed their valuable inputs for developing Vision 2050 of DRWA. I am sure the document will provide the researchers and other stakeholders a good account of what DRWA envisages for future and guide them in developing their strategy for addressing gender issues and empowering women in agriculture.



(M.P.S. Arya)
Director DRWA

30th June 2013
Bhubaneswar

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1. Context

‘Agriculture is the basis of all our development work. If we fail in agriculture, it does not matter, what else we achieve, how many plants we put up, our development will not be complete.’

“In order to awaken the people it is the women who have to be awakened. Once she is on move, the family moves, the village moves, the nation moves.”

Pandit Jawaharlal Nehru

1.1 Agriculture and women empowerment

The above quotes of Pandit Nehru succinctly and aptly describe the critical importance of agriculture and women in a nation’s development. These two things i.e. development of women and development of agriculture are essential to the development of any and every nation. When we talk of development of women and agriculture and think of achieving the same, it is impossible to ignore the linkage between the two. In other words, development of women and development of agriculture can never be treated as two mutually exclusive processes. In that context, ‘women in agriculture’ becomes a subject that is *sine qua non* for development of women in India and its agriculture. For a long time, the research and development systems considered men as the target groups and overlooked the real contribution of women. However in recent years, many studies from different parts of the world have provided credible evidences on the role and contribution of women in agriculture and the intricate relationship between women and agriculture, which is a two way process. While agricultural growth contributes to income and human development of those involved in agriculture (women and men), Human development of Women (and men) in agriculture influences agricultural growth. Therefore, empowerment of women in agriculture is seen as an important strategy to achieve for higher and inclusive growth of agriculture.

1.2 Work participation scenario

Women’s involvement in agriculture is complex and diverse, i.e. they are involved in wide ranging activities in agriculture and at home, unlike their male counterpart. However, the contour of women’s participation in agriculture is changing with changing profile of agriculture and development of non-farm sector. World over, about 42% of women workers were engaged in agriculture in 2010, down from

53.5% in 1980. In developing countries agriculture supported about 52.7% of women workers in 2010. However, there is considerable difference in the extent of women's participation across regions of the world. In south Asia and India, over 60% of women workers are in agriculture. (FAO, 2010-11). In India, according as per census India data, the female work participation rate (WPR), which is proportion of workers in total female population, increased from just 12% in 1971 to 25.6% in 2001, while male WPR has remained just over 51%.

But as per census 2011 data (provisional), there has been no improvement in the female WPR which stands at 25.56%, while male WPR improved to 53.21% from 51.7% in 2001. Share of agriculture in total women workers which was 71.8% in 2001 came down to about 65% which is a quite normal in the process of development. On the other hand, share of women in total agricultural workers which continuously increased during last 50 years to 39% in 2001 declined to about 37% in 2011, which is a bit surprising.

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A notable point is that, among Indian states, there is considerable gender gap in work participation rate. One of the interesting features of women's participation in India is that there is considerable variation across regions from north to south, across socio-cultural and economic groups, across ecological and production systems. It is therefore important to understand the dynamics of gender work participation, factors associated with and possible consequences for agriculture so that appropriate agricultural R&D interventions could be planned for sustained growth of sector. Tracking women's participation in different agricultural situations is also a pre-requisite for planning and promoting women friendly agricultural growth measures. In future, as the trend indicates, agriculture would be accommodating less and less number of workers. The absolute number of workers would also decrease steadily (Already number of total cultivators and male cultivators has declined in 2011) in agriculture. Therefore it is imperative to increase the productivity of workers, more importantly women workers, in agriculture through appropriate technological and policy initiatives.

1.3 NARS and Gender Research

The National Agricultural Research System of India, comprising 99 ICAR Research Institutions including five Deemed-to-be Universities, 56 Agricultural Universities and their Regional Research Stations, one Central University and 631 KVKs (as in June 2013) is the one of the largest research systems in the world engaged agricultural research and education. Research efforts of scientists have contributed to development of new technologies including varieties,

scientific crop management and post harvest management practices. At the same time, access of farming community to these technologies has also improved significantly leading to manifold increase in production of agricultural commodities. During 2011-12, food grain production in the country touched 259.32 million tonnes; horticultural production 232 million tonnes; milk production 127.9 million tonnes and fish production 8.7 million tonnes (Govt. of India 2012-13). All these are a clear testimony to the significant strides that agriculture sector has made during past decades.

Despite some of these remarkable achievements, there are many concerns that bother farmers, researchers and policy makers. One such concern with serious socio-economic implications is that of gender issues. Today gender issues are receiving increasing attention in the context of higher and inclusive agricultural growth. In fact, in India, women's role, gender issues and the need for creating opportunities for women was recognized long ago by the development planners and policy makers, as a result of which successive plans witnessed a number of programmes and mechanisms to address problems of women. But it took long years to recognize the need for a dedicated institution for gender research in agriculture.

Genesis of DRWA

Erstwhile National Research Centre for Women in Agriculture (NRCWA), now called Directorate of Research on Women in Agriculture (DRWA), was established in 1996 at Bhubaneswar marking the beginning of systematic research efforts on women in agriculture. This unique institution is expected to catalyze and facilitate agricultural R & D institutions to integrate gender perspective in their programmes, develop gender friendly technologies and policies to make women better and effective partners in agricultural growth process.

Mandate

Carry out basic, strategic and applied research to identify gender issues and test appropriateness of farm-technologies/ programmes/ policies with women perspective; and capacity building of stakeholders.

Objectives

- Undertake research to assess farm technologies, programmes, institutions and policies from gender perspective;
- Understand the dynamics of gender role in different agro-ecological and production systems and its linkages with agricultural development;
- Identify and understand drudgery related issues and other constraints among farmwomen for increasing their work efficiency;
- Develop gender focused S & T based innovations for livelihood and nutritional security;
- Create and maintain databases on gender in agriculture to meet information needs of stakeholders;
- Capacity building of R & D professionals for addressing gender issues in agriculture;
- Documentation and dissemination of gender based knowledge among stakeholders.

Brief research achievements

Since its inception, DRWA has been undertaking research on issues concerning women in agriculture. It has focused on participatory action research in different technology based thematic areas involving rural women to test suitability of technologies for women and suggest measures to make them women friendly. Some of the achievements of DRWA are given below.

Gender sensitive extension: Village Level Para-Extension Workers (VPEWs) model to bridge extension gap between farmers/farm women and development officials at block level by facilitating two-way flow of information and strengthening the micro level extension system.

Innovations in aquaculture: The Directorate has developed institutional innovations to augment availability of quality fish seeds at village level; successfully demonstrated scientific management of backyard ponds and large areas of derelict water bodies involving women.

Technology assessment and refinement: Different crop and horticulture technologies have been tested and refined to develop cropping such as mango and guava based models, intercrops to meet needs of farmwomen. Storage methods and techniques using ITKs have

also been standardized which can contribute to safe storage of cereals, pulses and other commodities by women.

Occupational health risk and drudgery: DRWA has so far evaluated and refined more than 20 farm tools to reduce drudgery based on ergonomic considerations; a women friendly maize dehusker-cum-sheller has been developed.

Family nutrition and women entrepreneurship: A sweet potato based weaning food developed to meet the nutritional needs of infants; studies on changing livelihood profile, market access and constraints and tribal families of Odisha have provided useful insights for planning sustainable livelihood interventions. DRWA has also developed modules for entrepreneurship development among women.

Gender sensitization: A conceptual model of gender sensitization process, framework to understand relationship between gender and agricultural R&D and gender sensitization materials for training of researchers, development professionals and academicians. Regular capacity building programmes organized to imparting training and orientation to R & D professionals from almost all states of the country.

Consultancy and advocacy: Provided consultancy services and advocacy to govt. departments on gender dimensions in agricultural and rural development programmes and policies.

Methodologies and approaches: Methodologies for integrating gender in agricultural research and assessment of technologies in gender perspective Methodology for engendering agricultural research developed. A gender work participation disparity index (GWPI) was developed to classify states/countries into low, moderate and high gender disparity categories

Farming system: Improvement in farming system was made through diversification / introduction of pulses vegetables, fruits and poultry in the backyard gardens.

Network projects on of gender issues: During XI Plan, DRWA implemented a number of network projects involving more than 40 institutions from ICAR and Agricultural Universities and assessed women's participation in different agricultural activities and identified gender issues in rice farming, horticulture, fisheries and livestock. Huge data sets generated from different states of India

Gender information system: A portal called 'gender knowledge centre' has been created that has components (pages) including information and statistics. A number of database structures and databases have been created based on data from various secondary sources; a reference system developed which is being enriched with addition of references.

AICRP on Home Science

AICRP on Home Science is another programme of ICAR that has research focus on women. It has five distinct disciplines and is being implemented by selected Agricultural Universities.

- Food & Nutrition
- Family Resource Management
- Human Development and Family Studies
- Clothing and Textile
- Home Science Extension Education

AICRP on Home Science has been focusing on following areas;

- Food based strategies to combat nutritional problems among farm-families.
- Characterization of nutritional diversity in selected farming systems.
- Technological and Socio- economic dimension of women empowerment
- Characterization of drudgery of women in the production environment and assessment of technology packages in mitigating drudgery.
- Functional clothing to combat occupational health hazards of farm workers.
- Utilization of plant sources for textile applications.
- Empowerment of farmwomen for entrepreneurship development.
- Developing competencies of rural youths in agriculture through Educational Intervention
- Sensitizing mothers for management of socio-emotional behaviour of adolescence.

1.4 Towards global recognition

In later part of XI Five Year Plan, DRWA led in organizing two major events; National Consultation on Gender Perspective in Agriculture and Global Conference on Women in Agriculture that catapulted it into national and international arena and earned it the recognition as a key research institution on gender in agriculture.

National Consultation of Gender Perspective in Agriculture

Held in New Delhi on 8-9 August 2011, the National consultation was the first of its kind country level interaction meet on gender perspective in agriculture. More than 250 scientists from ICAR institutions and Agricultural universities, research managers, extension professionals and policy makers attended the consultation to discuss and deliberate on a grey area, i.e. gender, in the context of agricultural research in India. The Consultation, at the end of two days deliberation, evoked lot of interest among participants on the subject, and created a favourable condition for carrying forward the gender agenda in ICAR.



Global Conference on Women in Agriculture

The Global Conference on Women in Agriculture (GCWA) held in March 2012 in New Delhi was a landmark event on many accounts. The Conference, for the first time, brought together the stakeholders, institutions and partners from more than 55 countries across the world and deliberated upon several issues (viz. empowerment, agricultural innovations, food and nutrition, market linkage, resources and services and climate change) concerning women in agriculture. The Conference also identified action points to improve the conditions of women in agriculture and suggested a way forward for global action. A unique feature of GCWA was an Innovation Market Place that was organized to showcase the successes in linking farm women to markets.

Directorate of Research on Women in Agriculture which was a key player in successful organization of Global Conference attracted

attention of global community as a potential partner for collaboration on gender research and women empowerment in agriculture. Importantly, drawing lessons from the Conference, DRWA is positioning itself in global context to meet the emerging challenges with highly focused and context based R&D strategy on women in agriculture.



DRWA participation in GCARD2

Following the success of Global Conference on Women in Agriculture, DRWA was invited to participate in GCARD2 held in Punta del Este, Uruguay during 29 October – 1 November 2012. The then Director, Dr Krishna Srinath attended the Conference made a presentation on *Research on Empowerment of Youth and Women: India Perspective* in the session 'Individual Learning and Empowerment of Women and Youth'. Participation in GCARD2 was another milestone in the history of DRWA in the sense that it put DRWA in the world map as a leading research institution on women in agriculture.

1.5 Lessons for future

Thus during nearly 15 years of its existence, some areas where DRWA has gained competency are methodologies for integrating gender in agricultural research and assessment of technologies in gender perspective, gender sensitization, formulation and evaluation of gender based programmes etc. But there are many core areas where DRWA is yet to develop its competency and deliver, if institutionalization of gender in agricultural research & extension has to become a reality.

Though a small institution within ICAR, DRWA has a larger role to play in emerging and future scenario. Given the critical linkage between women and agricultural growth; ICAR vision of achieving adequate production of healthy, nutritious and safe food for feeding its

ever growing population can only be possible if we could address gender issues in agriculture, and at the same time, strengthen the attitude, interest, knowledge base and capability of women to manage the changes in agriculture. Therefore it is paramount to develop a vision for next 40 years envisaging goals for different contexts and roles that this institution would ideally assume to contribute to realization of the goals, thereby justifying its existence and relevance. DRWA's vision also charts the path to realize the goals amidst numerous challenges. In many ways, the Vision 2050 document would provide a comprehensive idea about emerging challenges, priority areas of action and broad research strategy of DRWA and guide its scientists in meticulous planning of their research projects.

2. Challenges

The world population may cross 9 billion and the food demand would double by 2050. Can we produce enough to feed the population? If current trend in production continues, the world cannot produce enough to feed its population. This would invariably lead to increasing incidence of hunger and malnutrition. Moreover, when for feeding over 6.0 billion population, we are struggling so much for sustainable utilization of our land and water resources in view of the growing pressure on environment, how can we double to production without permanently damaging the environment? A lot remains to be answered and done.

From India perspective, population is expected to grow pass 1.6 billion by 2050. At present level of population and agricultural production, considerable gap exists between recommended and actual per capita consumption of major food items, except cereals. In such situation reducing the gap between recommended and actual consumption and producing enough to meet the demand of 1.6 billion population is certainly going to be a daunting task in the face of challenges such as reduced size of holdings, decrease water availability, increasing urbanisation and industrialization, shrinking fertile cultivable land area, inertia in technology adoption, migration from agriculture, climate related changes, growing competition, market risks and after all, declining interest of youth in farming.

Thus given the intricate relationship between women and agriculture, challenges for agriculture are also challenges for women. Poor prospects of agriculture would create more difficulties for women, via adverse effect on food availability, income, employment and health. Additionally, women face challenges from socio-economic fronts also that need to be addressed.

2.1 Access to resources & services

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 study, had they enjoyed the same access to productive resources as men, women could boost yield by 20-30 per cent; 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 per cent, besides increasing women's income (FAO, 2011). How to bridge this gender gap and improve productivity of women? What kind of innovations is required to ensure timely access to resources by women? Additionally, poor access to markets is also a factor that constrains women for getting a good price and good income of their produce. Lack of control over assets and resources is also another dimension to the economic marginalization of women. Thus inadequate and poor quality access forms an important link in the vicious circle of underdevelopment of farm women.

2.2 Globalization

A major concern today is the way and extent agriculture would be affected by globalization. In coming days countries would witness major policy changes in agriculture and other sectors. With opening up of economies, farmers in countries like India may be subject to greater pressure and more competition. Volatility in prices of agricultural produces in both national and international markets could adversely affect farming decisions that may affect production of different crops and farm income. In medium and long run, it could trigger structural changes including changes in cropping patterns. Structural and technological changes may thus affect agricultural production and income level of farmers, including women workers. How to protect Indian agriculture from adverse impacts of globalization? Extensive research is required to map the impact of such changes on agriculture, farm women and their livelihood in days to come, and identify sustainable solutions to these problems.

2.3 Food & nutritional insecurity

Persisting food and nutritional insecurity is a major development concern for global community. Though the number of undernourished in the world has declined over the years, during 20010-12 the number was almost 870million which was about 12.5% of world population. Regional spread of undernourished people indicates that about 23.0% of population in Africa, 27.0% in Sub-Saharan Africa and 17.6% of population in South Asia were undernourished during 2010-12. In India, the proportion of undernourished declined from about 27% during 1990-92 to about 17.5% during 2010-12, which is still very high (FAO, WFP, IFPRI,

2012). Women and children are worst affected due to nutritional insecurity. Poor nutrition is one of the damaging outcomes of gender inequality (FAO, 2005). 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 governments have tried to address the issue through nutritional supplementation and some other indirect measures, sustainable solutions to the problem still elude us. Importantly, high economic growth has not contributed commensurate to reduction of malnutrition. Sudden spurt in prices of important food items in recent years and its consequences for poor people has once again brought to the fore the fragility of food situation and vulnerability of poor including women and children. Therefore improving the performance of agriculture sector through gender focused agricultural innovations at micro level would hold the key to overcome the problem.

2.4 Natural resource degradation

Depletion and degradation of natural resources are a major concern for us today caused by over-exploitation and mismanagement. Importantly, loss of natural resource base including soil, water, forests, and biodiversity has wider implications for sustainable growth of agriculture and livelihood security of poor. Environmental degradation is a major factor in perpetuating poverty, particularly among the rural poor in the bio-rich northeastern region of the country (The Times of India 2010). Women, being directly involved in collecting items of food, fodder and fuel from nature, are more vulnerable to the adverse impacts of degradation of natural resources. Degradation of natural resources like soil, water, forests is an important cause of stagnating or declining yields. This is more so in fragile and disadvantaged regions where women are major contributors to family income and food security. Large scale encroachment of and Common Property Resources by private entities has also reduced access of women to these resources. Since the poor women draws a large part of their livelihood from these natural resources, their loss results in declining economic activities, reduced income and more burden on women. Given the linkage between natural resources, women and agricultural growth, protecting natural resources and empowering women can contribute to sustainable growth of agriculture. How to protect and conserve our natural

resources like ecosystems, biodiversity, soil and water resources? How to map vulnerability of women in different ecosystems and suggest measures for their sustainable development? How to plan programmes with gender perspective? Inter institutional and inter country collaborative research is required to find solutions to some of these problems.

2.5 Natural calamities

Natural calamities such as flood, cyclones have intermittently affected agriculture and the humanity causing loss of lives and livelihood and loss of resources. In the process, women are always at a disadvantage due to increased work burden and destitution. Often the impact of calamities could massive and there may be structural changes into the livelihood systems of affected people. There are instances of vast areas of cultivated lands turning unproductive under the impact of super cyclones following salt or sand deposition. Women, being the major workforce in agriculture and allied activities, come to bear the brunt of calamities. Women may find themselves burdened with greater responsibilities than before as 'post-disaster flight of men' occurs leaving them as sole bread earners. Small scale studies suggest that there is pattern of gender differentiation at all levels of the disaster process: exposure to risk, risk perception, preparedness, response, physical impact, psychological impact, recovery and reconstruction (WHO, 2002).

2.6 Climate change

Climatic changes related impacts loom large over agriculture as various studies suggest. Some of the climatic changes are variation in rainfall in many places; frequent droughts, frost in northern regions, frequent floods and cyclones in several regions, temperature rise and sea level rise. Global studies on projected impacts of climate change on agriculture in South Asia suggest 10-50 per cent loss in agriculture by 2100 (GCWA, 2012). Due to increase of average temperature, flowering behaviour of plants may change thus affecting yield of crops. Similarly, insect and pest incidences may increase in some of the important crops.

Rising ocean temperature may radically alter the aquatic ecosystems thereby modifying the fish distribution and productivity of marine and fresh water species. This has impacts on the sustainability

of fisheries and aquaculture and the livelihoods of the communities including women that depend on fisheries. Similarly rising temperature would adversely affect the prospect of livestock farming particularly that of dairy in which women are largely involved. Thus climate change phenomena could adversely affect prospect of agriculture, fisheries and livestock thus seriously jeopardizing the availability of food on the globe. An immediate impact could be on farmers and women through loss of farm income, livelihood and employment.

Furthermore, changing hygrothermal conditions might adversely affect human health and well-being depending on degree of heat stress. Farm women in particular may become more vulnerable as they are involved in more drudgery prone activities. Importantly, with a large proportion of farm women suffering from malnutrition the impact of climatic change could be more severe in long run on women's health, working capacity and participation in agriculture. How to protect women from such physical and physiological risks? What kind of adaptation and mitigation strategies with gender perspective is required to address concerns of women and agriculture?

2.7 Declining interest of Youth in agriculture

Over years, there has been exodus of workers from agriculture. This has been largely due to declining profits from agriculture, increasing risk in production and marketing of agricultural produces, severe input constraints such as high cost of inputs such as labour and fertilizer coupled with their limited supply. At the same time, opportunities in non-farm sector, particularly in urban areas, have been attracting workers from agriculture. Importantly, rural youths who were taking course to agriculture have lost interest in the occupation. When agriculture is becoming more knowledge intensive, how to retain educated youths including girls remains a great challenge. Moreover, retaining youth is also important to promote entrepreneurship development in agriculture.

2.8 Male migration

Now-a-days the phenomenon of male migration is becoming an important issue as far as its impact on women is concerned. Migration may have net benefit to the family but it leads to social loss in terms of loss of traditional social networks (Krishnaraj and Shah,

2004). Migrant males, who remain away from family for prolonged period, become oblivious to needs and concerns of family. As a result, women face increasing work load and mental stress and socio-economic vulnerability. The process affects family stability and development of children at home. Thus male migration compounds the already deep rooted social and economic problems faced by women. Studies also indicate that in women headed families the incidence of poverty is increasing. One of the reasons for this is the inability of women of such families to access productive resources such as modern agricultural technological know-how and tap opportunities in places beyond the village boundaries.

2.9 Institutional challenges

Apart from the challenges discussed above, there are many institutional challenges that have to be overcome to attain the goals and targets. DRWA is the only institution in NARS with exclusive research focus on women in agriculture. But its tasks and responsibilities are quite large. DRWA has to encompass the entire research system for strengthening gender perspective. With limited scientific manpower, how to reach out to the R&D institutions in the country remains a great challenge.

Past 15 years of research has been a great learning experience as far as achievements and shortfalls of DRWA are concerned. Many agricultural research institutions could not be brought into the loop and there has been a general reluctance on part of many agricultural researchers to accept gender as a research component and integrate it in their research. Lack of clarity on the subject, persisting doubts and pessimism in the minds of mainstream agri-researchers also came on the way of incorporating gender perspective in agricultural research projects. As a result progress towards strengthening women's role in agriculture through research based interventions has been tardy. How to demonstrate the utility of gender research with the technologists and how to convince them to work towards the goal of women empowerment? Institutionalization of gender in agricultural research has become a challenge because we need a shift in our approach to reorient agricultural research. The question remains, can we break the inertia that has gripped the research system for so many years?

Gender research in India is in its formative phase. How to develop gender in the context of agriculture into a good subject so as

to improve its acceptability? Moreover, quality research from scientists, particularly on concepts, methodologies, quantitative aspects, blending gender with technologies, is very much required to take it to next higher level.

Recent years has witnessed increasing trend in the enrolment of girl students in Agricultural Universities. In India, by 2012, about 36% of total students were girls. In many universities, girls constitute even more than 50% of total enrollment. No doubt this is a positive development. But can the situation lead us to more gender sensitive research and extension?

3. Operating environment

3.1 R&D environment in India

DRWA is uniquely positioned in ICAR system because of so many reasons. It has not only got a unique mandate but also is the only institution of its kind in NARS. While other research institutions have few distinct areas of work under crop science, animal science, fisheries, natural resource management and engineering; DRWA, on the other hand, has the flexibility of undertaking gender based research in any of the above subjects depending on domain women's involvement. Thus scope of research for DRWA is much bigger, but at the same time very specific as focus is to be given on women's activities and needs. DRWA, because of its very mandate, has got vast scope to collaborate with other research institutions, both commodity-based and natural resource based institutes. Moreover, research at Directorate demands proper blending of social science and other disciplines of agriculture.

With growing importance of women in agriculture, research on women is also gradually becoming a part of the research agenda of agricultural research institutions in ICAR. Moreover, ICAR has already taken some policy initiatives towards engendering agricultural research soon after the Global Conference on Women in Agriculture, 2012 by asking all research institutions to incorporate gender perspective in their major research programmes. Thus all ICAR research institutions have to gear up to adopt such changes in their research framework. This calls for greater interaction and collaboration of ICAR institutions with DRWA, which means larger responsibility for DRWA.

DRWA, being a public research institution, has to take into consideration the roles and mandates of other government and public institutions while planning its research strategy. Since in India there are many government institutions and agencies such as Ministry of Women and Child Development, Ministry of Agriculture, Ministry of Rural Development, Planning Commission etc. that are becoming more serious for addressing gender issues and empowerment of women, they would be looking at DRWA for new ideas and policy inputs. Accordingly while continuing research on technological innovations; DRWA has to give way to policy related research on gender. Thus as

we move ahead and come across new issues for agriculture, priorities of agricultural R&D institutions will also change. This will also reflect in the reorientation of activity profile of DRWA.

As gender assumes increasing importance as a subject in the R&D parlance with every passing day, demand from students and professionals for the gender courses would also increase, as such courses are likely to offer them a distinct advantage in the job market. In such situation DRWA may have to look for vertical expansion of its activities by combining research with short duration educational programmes (tailor made certificate or diploma courses) for different groups of stakeholders so as to improve their competency in addressing gender related issues.

A heartening fact today is increasing trend in girls' enrollment in agricultural education. Such a scenario is sure to create optimism among researchers and education professionals, as this may have positive bearing on the future of research on women in agriculture.

There are many other research and study centres in different educational and research institutions that are also involved in gender research, mostly social science based research. Some of these researches may be having relevance for women in agriculture or in related sectors. DRWA would also require keeping itself abreast of such development and finding opportunities to work closely with these centres in larger interest of society and women.

3.2 Global environment

Today there is a large constellation of national, regional and international institutions that are working for women in agriculture through research and development initiatives. For United Nations, gender is a priority area of global action. Realizing the critical importance of women in social and economic development, the United Nations have set 'gender equality and women empowerment' as one of the Millennium Development Goals (MDGs) for the countries and international bodies. In fact this MDG is very important and crucial in the sense that achievement of this MDG will also lead to achievement of some of the other MDGs including the first one, i.e. reduction of poverty and hunger. Other UN agencies such as FAO, UNDP have strong gender component in their R&D programmes. Coming to

international agricultural research, CGIAR institutions have, of late, accepted gender as an important component of their research, and therefore, are taking steps to make gender in-built in major research programmes. CG Institutions like IRRI, IFPRI, ILRI and ICRISAT have already created good impact through gender based researches in agriculture.

Many other international, country-based, regional organizations have become active in the area of gender research and development in agriculture. Forum for Agricultural Research in Africa (FARA), Association of Agricultural Research Institutions in the Near East and North Africa (AARINENA), Egyptian Social Fund for Development (SFD), Bangladesh Agricultural Research Council (BARC), USAID, BMGF etc are some of organizations that have taken up gender focused activities to promote women empowerment and reduce gender inequality.

For tracking the progress of countries in terms of development, UNDP has been administering indices such as Human Development Index (HDI) and Gender Inequality Index (GII) every year. Based on values of these indices countries are ranked to reflect their relative performance along certain indicators. In 2012, India ranked 136 among countries in terms of human development with HDI value of 0.554 which reflect poor performance of India in relative terms, though the value of HDI improved from 0.410 in 1990 to 0.554 in 2012. Similarly according to Gender Inequality Index (GII), India ranked 132 with GII value of 0.610 (UNDP, 2012). Significantly many Asian countries including Pakistan, Bhutan, Bangladesh, Cambodia, and Myanmar have better rank in term of GII, despite faring worse in terms of HDI. On the other hand countries like Sweden, The Netherlands, Denmark, Norway and Switzerland are on the top of the chart in terms of their achievement in terms of gender equality. Thus India has to work very hard to improve its situation, and in this context role of research institutions will be paramount.

Today we are living in a global village where geographical barriers are shrinking; barriers to flow of information and knowledge are fast disappearing. Issues that were once confined to particular areas, countries and warranted country based action have now assumed global character; attracted global attention giving way for global efforts and partnerships among organizations and countries to find solutions to many of the impending development problems faced

by the humanity. Therefore, DRWA has to create a niche for itself in order to contribute to cause of women empowerment and gender equality both at national and global level. This can be achieved by working not in isolation but in collaboration with other institutions. Thus, while DRWA will be facing competition from many institutions already working in similar areas, at the same time, it can also benefit from presence of other institutions to realize its goals and targets.

3.3 Farm women environment

The environment in which farm women operate is a dynamic one; socio-culturally and technologically. Despite enormous changes in the socio-cultural situations of our country, rural women face strong social and cultural barriers which curtail their freedom of making social and economic choices due to prevailing gender biases. This happens within the family and also in the community. In many situations women in their collective pursuits either face direct resistance from male folk of their community or do not get required support from them at the time of need. As small families become norm of the day, women might face obstacles in the form of limited mobility due to family responsibility, and socio-cultural restrictions in their quest for socio-economic development. Moreover, women might find themselves at the cross roads with competing demands of their time and energy for reproductive, community management and productive roles. How can women balance their triple roles?

Resource environment of farm women is also poised for a great change. Access to certain resources such as land, water, fuel and fire wood is going to be more restricted in coming days. As a result of which women will be under more pressure to manage their so called gender roles. Similarly, cost of certain services like health and education may go up creating undue financial burden on women, despite increased allocation by government to these sectors. On the other hand, technological environment of women is also changing. Today women have relatively greater access to information and communication technologies which might help women in better decision making.

4. New opportunities

Future of agriculture and its capacity to meet the growing needs of burgeoning population in terms of food and nutrition, fibre, fodder and fuel, depends on the pace of scientific and technological advancements in agriculture and other fields of science; and their application. Given the fact that women are involved in almost all activities, barring a few, during production and post production phases in crop, livestock, fisheries and other related sectors; any knowledge and technology that can improve women's working efficiency and resource use efficiency; help in conservation of resources and developing new products; enhancing quality of products and scope of application of existing technologies can create new opportunities in agriculture. Expanding opportunities in agriculture may well bring forth more scope and opportunities for women.

Scientific knowledge and technologies by themselves may not usher in new opportunities. These need to be adopted and applied. This calls for appropriate policy environment that can catalyse flow of knowledge and technologies and their application in need based areas. Since DRWA is focusing primarily on women as clientele, creating a congenial environment therefore becomes important to enable them take advantage of opportunities and strengthen their participation in the growth process.

4.1 Seed technology

Quality seed is a critical factor for enhancing agricultural production and productivity. Advances in biotechnology, molecular breeding, genetic engineering and nano technology are opening up new possibilities for seed science. Scientists are working to develop new varieties that can withstand adverse conditions such as drought, water logging, salinity and pest attack. Such efforts offer new promises for agriculture, and at the same time, bring new hopes for farmers, particularly women, who are, and who will be the key actors in managing agriculture.

4.2 Crop management

Crop management is an important aspect of agriculture for better utilization of resources and increasing yield. As resources become limited and cost of inputs increases, research on crop management assumes more significance in view of multiple goals with which farming is done. Today it is not only higher production, but also good returns, good quality and better nutrition that determine agricultural management practices. Technologies such as zero tillage are creating good impact in the field. Cost reduction and conservation of natural resources that accompany adoption of these technologies can create economic opportunities for women. Different cropping models are being developed around the concept of nutrition garden to meet the food and nutrition needs of families. Such technologies would create opportunities for women in their homestead and ensure nutrition to their families.

Similarly new water management practices, including conservation and application, using advanced scientific and technological knowhow may become realities in future. This would encourage women's participation in water management as these may not involve much labour and time.

4.3 Fisheries and livestock technologies

With marine fisheries production dwindling over years and fish production from natural water sources like rivers, lake etc. declining, meeting the future fish demand of the country largely hinges upon effective utilization of fresh water resources. Breeding, production and management technologies for Indian Major Carps (IMC) have revolutionized fish production in rural areas. Apart from these, scientists have been successful in developing breeding techniques for some minor carps and catfishes that are fast disappearing from rural ponds. Integrated fish farming technologies, fresh water prawn production technologies, crab fattening technologies have created new opportunities for enhancing fish, prawn and crab production. Importantly, these technologies can be applied in vast fresh water resources including derelict water bodies available in the countryside with involvement of women which is a potential avenue for socio-economic development of rural women. Similarly, given their involvement of in post harvest activities, technologies for production of quality dry fish, value added fish

product and packaging can create good market opportunities for women.

In livestock sector too, advancements in science and technology will be creating opportunities for women. For example; cloning is finding increasing application in development of breeds with desirable traits, even for particular regions. Thus the technique can be used to reproduce animals and replenish their declining population. Stem cell research will be highly useful in treatment of fatal diseases in livestock.

4.5 Secondary agriculture

Post harvest losses in agriculture have assumed alarming proportion. This is mostly in case of cereals, fruits and vegetables. Therefore saving such losses could generate huge employment and income opportunities for youth and women. But unfortunately the potential of secondary agriculture has not been harnessed. Scientists are working to develop modern post harvest management and value addition methods through both product and process technologies with application of knowledge from physical, chemical science and engineering. Such technologies would promote entrepreneurship in rural areas by strengthening the forward linkage in agriculture, thus creating economic opportunities for rural and urban women.

4.6 Organic farming

Indiscriminate use of pesticides for controlling pests and diseases has not only caused irreversible damage to the environment, but also has increased health risks and hazards through production and consumption of unsafe foods. Therefore the concept of organic farming is gaining popularity. Moreover, organic products have huge market both within and outside country. Therefore with increasing income of people, demand for organic produces would increase. This would create opportunities for women to participate in organic farming of crops, particularly vegetables. Moreover, research on development, production and application of bio pesticides has been a great success and there have been good examples with bio pesticides involving women. Thus a huge future prospect in development and application of bio pesticides would bring new opportunities for women in agriculture. Similar is the case with bio fertilizers particularly with respect to application. The recent innovation by Anand Agricultural

University (AAU) in Gujarat is something to be happy about the future of agriculture and women.

4.6 Innovations in engineering and mechanization

Mechanization is proving to be a boon for agriculture. Pace of mechanization depends on advances in engineering. Mechanization and automation of different activities is essential to realize a significant improvement in productivity of agriculture in the face growing labour constraints and other management problems. Thus engineering innovations holds the key for transformation of Indian agriculture to higher level efficiency and economies of scale. Today many of the machines are not women friendly. But scientists are striving to improve the existing machines and equipment with innovations so as to enhance their efficiency and make them women friendly. Research is going on to develop new tools and equipment for different activities carried on by women. Thus future may witness increasing pace of mechanization that would reduce dependence on human labour in some areas, but at the same time, may create new opportunities in other areas. Moreover women, with increasing literacy and education, may find new opportunities to acquire new skills for operation of machines and equipment that Indian agriculture would be badly requiring.

4.6 Policies and institutions

National Agriculture Policy formulated in the year 2000 accorded high priority to recognition and mainstreaming of women's role in agriculture and highlighted incorporation of gender issues in the agricultural development agenda. As a result, appropriate structural, functional & institutional measures are being promoted by Ministry of Agriculture and other Ministries also to build their capacities and improve their access to inputs, technology and other farming resources. Under the National Policy of Farmers 2007, various Policy measures have been taken for empowering women in farming & allied areas and improving their access to land, credit and other services, such as Joint pattas for both homestead and agricultural land, speedy issue of Kisan Credit Cards, creating multiple livelihood opportunities through crop-livestock farming systems, agri processing, etc.

Today gender budgeting is being institutionalized at all levels by ensuring allocation of 30% of funds for women under various major schemes/programmes and monitoring the implementation and outcome of such a provision. There are also a number of women specific programmes like Mahila Kissan Sashaktikaran Pariyojana that aim at empowering women and improving their socio-economic conditions. Such efforts may multiply in coming years. Significantly, women's participation in decisions making at household level and in governance would increase manifold. Thus with gender mainstreaming in agriculture high on agenda, increased allocation in different agricultural schemes together with convergence of programmes would create more space for women and contribute to their empowerment.

5. Goals & targets

5.1 DRWA 2050

Next four decades would witness many challenges as well as new opportunities for agriculture. Attaining the goals of the nation and the research system would be a herculean task. How should then the Indian Council of Agricultural Research and its constituents be reoriented and rejuvenated with new approaches and strategies of their research preparedness to overcome the challenges in next 40 years? In this context, DRWA, which is the only research institution in ICAR dedicated to gender research in agriculture, would work towards bringing scientific, technological and policy innovations for harnessing women's potential in agricultural development.

Vision

Emerge as a leading centre for gender research and serve as a catalyst for gender mainstreaming and women empowerment to realize enhanced productivity and sustainable growth of agriculture.

Mission

Generate and disseminate knowledge and technologies to promote gender sensitive decision making for enhancing efficiency and effectiveness of women in agriculture.

Focus

DRWA recognizes 'farmwomen' as an important partner and human resource for sustainable development of agriculture, and hence, considers them as the central subject of its research paradigm. Therefore it strongly advocates gender sensitive agricultural R & D strategies to address issues confronting women and agriculture. To accomplish the vision and mission, DRWA, in the scheme of its R&D strategy, has several stakeholders to work with keeping in view their needs, constraints and prospects. They are; farm women, NARS, Govt. Departments, NGOs and the community at large. This apart, DRWA has also to set some goals for itself considering the future scenario of agriculture and women. Importantly, it has to undergo structural and functional transformation, if at all it is to facilitate transformation of its stakeholders. Role of DRWA for all the stakeholders and envisaged outputs and outcomes are discussed below.

5.2 National Agricultural Research System (NARS)

DRWA, being a part of NARS, has a significant role to play in transformation of NARS as a gender aware and sensitive organization. As a large part of our National Agricultural R&D system is not yet gender sensitized, concerted efforts will be made to make the R&D professionals gender sensitive, create an enabling environment for better appreciation and understanding the gender issues and develop gender encompassing R & D strategies, approaches and institutional convergence.

DRWA would consistently work towards engendering agricultural research in NARS so as to understand gender implications of agricultural research and to make research outputs available to women clientele. At present, the research projects/programmes, while having objectives related to agriculture sector, invariably lack gender perspective, and scientists do not explicitly mention the gender-based outcomes or utilities of their research in their proposal. However, in the process of engendering agricultural research, gender will be made an in-built component of research projects and certain gender-based monitoring and evaluation indicators will be identified to assess the output and outcomes. DRWA will develop separate modules on gender that can be used during training of scientists that can enable them integrate gender perspective in their research programmes.

Adding gender perspective in research process would enhance applicability of knowledge, methodologies and technologies in terms of their adoptability and acceptability by and for women. Thus DRWA envisages a gender sensitized research system and would strive towards making agricultural research engendered so that ICAR and AUs can address gender issues in agriculture thereby contributing to higher and inclusive growth.

DRWA will contribute to the development of concepts, methodologies and databases for gender studies and gender mainstreaming by various R&D institutions. DRWA also envisages complete mapping of gender role in diverse agro-ecological and production systems of India that would help in holistic understanding of gender perspectives in varied situations, better R & D planning by scientists and effective targeting technologies and policies.

5.3 Government Departments

Currently DRWA is engaged in consultations and advocacy on gender convened by government departments. In due course of time, DRWA will develop competencies to act as think-tank for government on gender based policy making in agriculture and rural development, thus, hastening the process of gender mainstreaming whereby women can contribute more to agricultural growth and access the benefits of growth. This is to be achieved by focusing more and more on policy related researches in agriculture and action researches for developing and demonstrating successful models that can be easily up-scaled. Furthermore, it will act as a premier agency for evaluation of gender based programmes and policies in agriculture.

5.4 Farm women

As already mentioned, farm women are an important human resource for agriculture. Therefore empowerment of farm women holds the key for sustainable growth of agriculture. In this context, DRWA would work with other partners towards bridging the gender gap in access to agricultural resources, knowledge and services thereby creating a level playing field for women. DRWA, through its research efforts, would identify interventions to enhance the capability of women, create more space, improve their productivity and harness their potential for agricultural growth. Towards this end, DRWA will develop gender friendly extension innovations and work on leveraging emerging and future Information and Communication Technologies in partnership with other agencies.

Central to the empowerment is the decision making by women. In both rural and urban areas men are major decision makers and women's say in decision making particularly in respect of economic decisions is marginal. This is even true in cases where women contribute a lot to economic betterment of households. Therefore, enabling women to become informed decision makers both for household and farm related activities and creating conditions for equal participation of men and women in decision making is what DRWA would envisage by 2050.

Towards this end, DRWA would facilitate development and dissemination of information, knowledge and technology modules on

specific activities and enterprises to bring about knowledge and technological empowerment of women.

Entrepreneurship development is considered a strategic intervention for demonstrating and showcasing technological excellence in agriculture, and creating demand for scientific knowledge and technologies by farming community. If emerging scenario is any indication, the future prospect of Indian agriculture will largely depend on the response of women in terms of participation in agriculture and spontaneity in accepting new values for a transformative and sustainable agriculture, and their capability for adoption of technologies and application of scientific knowledge. Keeping these in view, DRWA would work with other agencies in developing women entrepreneurship models in agriculture and suggesting mechanisms for their replication. By 2050, India should have women entrepreneurs at village level demonstrating the performance and impact of technologies.

Phenomenal growth of women SHGs has been a significant development in the country side that can usher in socio-economic transformation of rural areas. But the desired dynamism, strength and coherence are missing in large number of women SHGs and group activities are virtually absent due to many internal and external factors. It is time that we make best use of the network of WSHGs and harness their strength for the cause of agricultural growth and eco development. DRWA will carry on research on women SHGs and develop models for making them vehicles of agrarian transformation and sustainable natural resource management.

Most of the operations that women perform in agriculture and related fields involve risk and drudgery. Women also face health hazards during the course of their involvement in those activities. Therefore DRWA would work on its own and in collaboration with other agencies to develop women friendly tools and equipment for reducing drudgery and improving efficiency of farm women in different agricultural operations. It will also undertake research to address safety issues of farm women.

5.5 Society

DRWA envisages a transformed society free from orthodoxy, gender biases and gender discrimination by 2050 which will provide

women equal opportunity vis-à-vis men in nurturing their creativity and realizing their potential. Increasing representation of women in politics and in other fields is a clear indication of the changing socio-political climate of the country. Obviously this will make our society more flexible and open. To hasten the process, DRWA will develop gender sensitization materials with clear messages based on its research projects and disseminate through various extension agencies and NGOs. DRWA will help in developing gender sensitization strategies including methodologies and content for different target groups. Importantly, DRWA will advocate introduction of gender courses in curriculum at school and college level so that students from the beginning of their educational career can be gender sensitized which will ultimately shape their behavior and change the stereotype mindset of boys and girls.

Nutritional insecurity and nutrition related health disorders; physical, physiological and psychological; are emerging as serious threats to human happiness, productivity and human development which have far reaching implications for the economy and agriculture. For long, undernourishment has been a great challenge for a country like India which is largely related to low calorie intake. Despite the fact that the percentage of undernourished people in India is continuously declining, it is still at a higher level. But in next 10-15 years we may be able to close the calorie gap. However, the problem of malnutrition, which is characterized by lack of adequate nutrition (mostly vitamins and minerals) despite having required calorie intake, would continue to loom large.

Therefore DRWA envisages creating a nutritionally secure society by 2050. Though there are many agencies including government departments and NGOs working to fight malnutrition, DRWA, as a part of its responsibilities, would devise research based interventions to spread nutrition awareness education among women, and develop Science and Technology based agricultural models with involvement of women at village level to demonstrate contribution of women and agriculture to nutrition security. DRWA would also come up with research based convergence models for nutrition projects/programmes at national, regional and local level for up-scaling.

5.6 Output & outcomes of DRWA

Considering the emerging and future challenges in agriculture and its role towards different stakeholders, DRWA would prepare itself to achieve the following by 2050 to best serve the women, agriculture and the society.

I. Centre of Excellence in gender research: DRWA would acquire and develop competency to grow as a Centre of Excellence on gender research in agriculture. As a premier institution in the country, it would develop guidelines, frameworks and methodologies for undertaking gender research in agriculture and support other Agricultural Research Institutions (ARI) in making their programme gender sensitive. It would also engage with global institutions to identify country level, regional and global policy priorities for women in agriculture.

II. Think Tank for gender based policy making: Being a public institution, it would play a major role in policy advocacy to make agricultural and development policies and programmes gender equitable. It would support various Ministries and institutions on identifying, formulating, implementing and evaluating gender based programmes.

III. Resource agency for women empowerment in agriculture: As a research institution it would support women SHGs, Govt. Departments and NGOs with new ideas, models and innovations to bring about empowerment of women in agriculture.

IV. Repository of gender information: DRWA would serve as a repository for gender related information in agriculture for planners, researchers, academicians and students to help them plan gender based interventions and studies. The repository would be created mostly using the data/information being generated under various research projects of DRWA and other ICAR institutions. It would also draw upon other secondary sources for data on topical issues and process for new insight and inferences.

V. Global hub for Human Resource Development: DRWA envisages growing as a global hub for HRD in the areas such as gender sensitization, gender analysis in agriculture, Gender planning in agricultural research and extension, gender monitoring & evaluation

and methodologies for gender studies. It expects to attract researchers, development professionals and students from India and other developing countries as well to develop their skill and capability for gender research and planning. Efforts of DRWA are expected to bring the following output in the context of women, gender research and agriculture.

- New knowledge, concepts and methodologies for gender based decision making and intervention
- Availability of appropriate drudgery reducing options including tools and implements for women to save their time and energy;
- Gender disaggregated information on socio-economic status and participation in agro-ecological regions and different production systems.
- Training manuals, extension modules, gender notes, research papers and other knowledge products relating to gender
- Trained and gender sensitized scientists and development specialists who can study gender issues in agriculture and suggest suitable interventions for women empowerment.
- Gender sensitive environment
- Greater adoption of technologies leading to technological and economic empowerment of women in agriculture
- More economic space for women, increased efficiency, informed decision making by women
- More production, better nutrition and nutrition secure families

Certainly, a lone institution or a few will not be able to achieve all the goals there are envisaged for agriculture, farmers and environment. However, as a responsive organization, DRWA, through its research endeavours, would work closely with other stakeholders to create opportunities for women in agriculture make agriculture a worthy and an attractive profession for women

6. Way Forward

Foreseeing the future challenges, adapting to new situations and taking advantage of new opportunities, DRWA will develop strategies with short, medium and long term perspective to achieve its vision and mission. Key areas of focus of such strategies would be developing institutional capacity for research and partnerships to leverage the strengths of different institutions working for women in agriculture.

6.1 Strategy and framework

A 5-point strategy would be adopted by the Directorate of Research on Women in Agriculture to accomplish its vision and mission.

- ❖ **Develop a strong human resource base in the institution**
 - Strengthen the scientific cadre strength by creating more scientific positions including social scientists
 - Upgrade the Directorate to an Institute with additional manpower and financial & functional autonomy
 - Develop specialization among scientists and identify key areas of training for scientists in national and international organizations
 - Facilitate exposure of scientists to international scenario and develop mechanism for regular exchange of knowledge, ideas and experiences
 - Create an enabling environment to scientists to harness their talent and promote creativity
 - bring in reforms in O&M and adopt new technologies for better organizational efficiency

- ❖ **Improve research efficiency and relevance**
 - Prioritization of research from stakeholder perspective and undertake research on issues having both immediate and long term implications;
 - Identify proper mix of basic, strategic and applied research considering stakeholders need
 - Link research to development needs and challenges of farmwomen and agriculture

- Create divisions with multi-disciplinary team of scientists for research on broad thematic areas and promote more interaction among scientists;
 - Better research planning with clear objectives and conceptual and methodological clarity
 - Action research with 'Famer First' approach to create visible impact in village
 - Establish mechanism for regular scientist-clientele interface to get feedback on emerging changes and problems for new research perspective;
 - Develop mechanism to monitor and evaluate research progress by linking research success to quality of output and its utility for end users
- ❖ Facilitate accelerated dissemination of gender based information & knowledge
- Organize workshops and interfaces to inform stakeholders of new knowledge, ideas and concepts;
 - Awareness campaign among wider audience to spread gender related information requiring public and stakeholder attention and action;
 - Improve documentation to generate quality knowledge products based on research for different stakeholders;
 - Strengthen the ICT capability to create network of end users and prompt sharing of knowledge;
 - Create a flexible mechanism for meet the demand of stakeholders for gender based knowledge, products etc.
 - Develop and strengthen gender information system with databases and user-friendly information retrieval system
- ❖ Create a large pool of gender sensitized and competent professionals
- Organize regular gender sensitization programmes and need based training for institution heads, R & D professionals with more emphasis on outreach programmes for same/similar stakeholders;
 - Develop quality training modules in relevant areas for better understanding and appreciation of gender issues;
 - Develop mechanism to create a group of first rung of professionals in different regions with capability to address gender issues

❖ Foster linkage and partnerships to broad base the research activities

- Strengthen linkage with other ICAR institutions, Agriculture Universities and KVKs for demonstrating gender outcomes of agricultural research;
- Identify research areas based on common interest; prepare clear guidelines to share responsibilities and resources among institutions;
- Partnerships with NARS, regional fora and international organizations like CGIAR, GFAR, FAO, World Bank etc. for global indicatives.

6.2 R & D focus of DRWA

The following broad thematic areas are identified to develop a strong research agenda that could yield concrete output and outcomes in tune with the objectives of the Directorate. Moreover, such a research arrangement based on thematic areas would help develop competencies in scientists in specialized areas to cater to the demands of various stakeholders.

Sl. No.	Broad research domains	Major research focus
1	Technology Assessment and Refinement	<ul style="list-style-type: none"> • Technological needs of women and gender issues in agriculture including livestock and fisheries • Assessment and refinement of technologies, agri-systems with gender perspective • Science & Technology based models to meet needs of women and their family • Technological innovations for resilient agriculture and livelihood
2	Socio-economic and Policy	<ul style="list-style-type: none"> • Gender-based assessment of agricultural programmes and policies and identification of interventions • Dynamics of gender role in context of agricultural (agro-ecological and production systems) and economic development • Structural and technological changes in agriculture and gender

Sl. No.	Broad research domains	Major research focus
		<ul style="list-style-type: none"> • Nutrition policy and dynamics of Livelihood systems • Tools and indices for measuring and monitoring gender based differences
3	Knowledge, Institution and Extension	<ul style="list-style-type: none"> • Gender-based assessment of extension systems and institutions • Database and knowledge management • Capacity building of stakeholders and Dissemination of gender based knowledge among stakeholders
4	Ergonomics and Drudgery	<ul style="list-style-type: none"> • Ergonomics involving women in different work environment • Drudgery, health risks of women and identify interventions • Assess equipment/tools in gender perspective; develop and demonstrate women friendly tools and equipment to improve work efficiency
5	Resource management and Women Empowerment	<ul style="list-style-type: none"> • Understand and address issues related to household and farm resource management for higher agricultural productivity and household livelihood security • Efficient resource use models for women and household • Management of common property resources • Gender role in sustainable natural resource management • Approaches and models for women empowerment and entrepreneurship development in agriculture

Thus, DRWA will move ahead with its plan and strategy keeping in view the needs of different stakeholders, and keep on rejuvenating itself with new ideas and competencies to establish itself as a premier global institution on women in agriculture.

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Vision is like an attractive sun shining with the innumerable possibilities to be achieved



हर कदम, हर डगर
किसानों का हमसफर
भारतीय कृषि अनुसंधान परिषद

Agrisearch with a human touch