



Improving the Livelihoods of the Resource-Poor Smallholder Farmers and Producers in Developing Countries: An Urgent Appeal for Action by GCARD

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**Submitted by:
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Summary

This document has been contributed by a group of social scientists and ARD stakeholders, committed to facilitate the GCARD consultation so that it is inclusive of the opinion of all ARD Stakeholders in contributing to increasing net incomes, purchasing power, livelihoods and sustainability of the poor smallholder farmers and producers and their communities in the developing countries.

Of the 3 billion people that live in rural areas (nearly half of the humanity), about 2.5 billion are involved in agriculture and 1.5 billion (half of the rural area population) are resource-poor small holders. These resource-poor smallholder farmers and producers concentrated in the rural areas and mountains make up the majority (85%) of farmers in the developing world. They are among the poorest group of farmers and thus become important in the context of eliminating poverty and hunger from the developing world.

[The Global Conference on Agricultural Research for Development \(GCARD\) 2010](#), to be held in Montpellier, France from 28-31 March 2010, should use this paper as the basis to develop an action plan and strategy for improving agricultural research globally in order to make maximum impact on development, especially for the poor small producers. This paper provides an opportunity to all the stakeholders of AR4D to discuss and decide the world agenda for AR4D. Considering the importance of poor smallholder farmers/producers in the developing world, there is a need to utilize this opportunity to change the world agenda for AR4D so that livelihoods and wellbeing of the resource-poor smallholder farmers/producers in the developing countries could be improved. This document, which has suggestions on how the Action Plan could be developed and approved at GCARD also briefly discusses how GFAR and CGIAR could help improve the livelihoods of the smallholder farmers in the developing world.

The document discusses the importance, situation of the smallholder farmers in the developing world, and emphasizes the urgent need for action to meet the need based funding, AR4D, extension, etc., to ensure they are enabled to harvest crops of all seasons. It discusses the challenges that have been identified in different regions of the developing world through the GCARD consultation process, which include: (i) Food, nutrition and health security, (ii) Increasing the net incomes and purchasing power and improving livelihoods, (iii) Protecting the environment, (iv) Achieving structural reforms of the agricultural research (AR), education and extension systems, (v) Meeting the special challenges, and (vi) Making ARSs inclusive and follow a bottom up approach. In addition, it takes into consideration the exchanges of the E conference and the F2F, both an important part of the GCARD consultation process.

Among the suggestions for the Action Plan, the document lays emphasis that the AR4D should focus on the smallholder farmers' development needs. Actions for different priority areas of research identified during the GCARD process in different regions are suggested. These include suggestions for: (1) Action for Institutional Issues: Action research, education, extension and linkages and collaboration; (2) Action Research for Development Issues: Improved technology for sustainable production (livestock research including rangelands, horticulture, seed systems, water resources and irrigation management, forestry, fisheries mountain agriculture); (3) Effecting Necessary Policy Shifts: Agricultural development policies, and marketing of agricultural produce/ products; (4) Environment Protection Issues: Reduce agriculture's large environmental footprint and overcome the challenge of climate change, and protecting biodiversity degradation; (5) Socioeconomic Issues: Gender/women-related issues, and livelihoods and poverty analysis.

The document also briefly discusses importance of development pathways and how the developing countries could use them for the priority areas of AR4D. Finally, it emphasizes the importance of an integrated approach to fulfill the requirements for agricultural development.

It should be emphasized that the five regions in the developing world have good potential for AR4D in the immediate future. Considering the present state of affairs, the regions could either become self-sufficient and meet their nutrition, health and food needs, or become a potential hot spot for poverty because of: (i) shortage of irrigated land, (ii) shortage of water, (iii) adverse effects of agro-chemicals used on their land and thus the proportionate increased need of water each year and contaminating subsoil water, (iv) increasing population, (v) shortage of safe nutritious and quality food, (vi) climate change and desertification, and (vii) isolation of the world community by the net producers (Australia, Canada, and the USA).

Therefore, the issues that are of immediate and vital importance include: (i) Strengthening of the existing potential for knowledge creation, (ii) Strengthening knowledge transfer mechanisms, (iii) Developing collaboration, partnerships and linkages among different stakeholders of AR4D at the national, sub-region, regional and the global levels, and (iv) Focus on the development of poor smallholder farmers and producers in rural and mountainous areas of the developing countries.

Considering the above and the potential that all five regions of the developing countries have, it is important that the governments make the required investments in and provide the required support to agriculture and AR4D to meet the needs of the poor smallholder farmers and producers and their communities, which in turn would meet the MDGs. Likewise, the international research and development organizations (CGIAR, FAO, etc.), the regional and international development organizations (IFAD, etc.) and banks (World Bank, Asian Development Bank, African Development Bank, etc.) must come forward to help the regions to ensure the needed funds for agriculture and AR4D, with the specific undertaking that these be used to meet the needs of the poor smallholder farmers and producers. The smallholder farmers/producers have been ignored for a long time, and let us at this stage commit ourselves to help them to overcome their difficulties and improve their livelihoods.

Improving the Livelihoods of the Resource-poor Smallholder Farmers and Producers in Developing Countries: An Urgent Appeal for Action by GCARD

1. The Context

Agriculture is a source of livelihood for a vast majority of people in the developing world which accommodates a total of 5.5 billion people of which 3 billion live in rural areas (nearly half of the humanity). Of these, nearly 2.5 billion rural people are involved in agriculture and 1.5 billion (more than half of the rural area population) belong to small holder households. These resource-poor small holder farmers and producers (herein after referred as small holder farmers) make a vast majority (85%) of farmers in the developing world. These smallholder farmers are distributed in all the three worlds of agriculture – i) agriculture-based, ii) transforming and iii) urbanized (World Bank, 2008) but are mostly concentrated in the agriculture-based (typified by Africa) and transforming countries (typified by China, India, Indonesia, Morocco, and Romania). It needs to be emphasized that the smallholder farming, also known as ‘family farming’ - a small-scale farm operated by a household with limited hired labour – remains the most common form of agriculture, even in industrial countries.

Many countries of the developing world, based on theories emanating from organizations such as the World Bank that small holder farming is inefficient, backward and resistant to change have tried to promote large-scale farming, but this experiment has clearly shown that this was not sustainable and sometimes even disastrous. In contrast, Asian countries that decided to promote small family farming were able to benefit. Experience in China also showed the failure of collective farms but smallholder farming was found sustainable. Similar was the experience in India and Indonesia who recovered from the verge of their hunger crisis. These countries used agriculture as an engine of growth and the basis for industrialization.

Post-green revolution, the agriculture in the developing world is now on the cross roads and facing new challenges including that of environmental damage that have arisen because of intensive, high-input, mono cropped agriculture. The sustainability of such an agricultural system, especially for the resource poor small holder is now being questioned globally.

The world agenda for agricultural research for development (AR4D) is currently being considered through the GFAR organized Global Conference on Agricultural Research for Development (GCARD). GCARD involves participation of representatives of all the stakeholders of AR4D in the developing countries. This provides a good opportunity to reconsider the approaches that should be adopted to deal with today’s agriculture in the developing world. Since a vast majority of farmers in the developing world are and will continue to be resource poor small holders, there is an urgent need to reconsider and refocus the AR4D agenda to improve the livelihoods of small holder farmers and their communities, by focusing on quality, safety and net productivity in a sustainable manner to meet their and their communities needs and for the markets especially in the local vicinity. This is one assured way of increasing

net income and purchasing power, thus eliminating poverty and hunger in the rural areas in the developing world where most of the small holder farmers live.

The paper highlights the ongoing GCARD process, the cause of the small holder farmers' poverty in the developing world, and suggests actions to improve the productivity of their farms in a sustainable manner without harming the environment and to improve their livelihoods and their present and future generations.

2. The GCARD 2010 Process

The Global Conference on Agricultural Research for Development (GCARD) 2010, which will be held in Montpellier, France from 28-31 March 2010, will provide an action plan and strategy for improving agricultural research globally in order to make maximum impact on development, especially for the poor small producers. It was decided that this plan and strategy will be developed on the basis of a global framework of agricultural research needs and priorities, which will be established through consultations which are inclusive, with representatives from a wide range of agricultural research stakeholders as equal partners around the world. It was also envisaged that the Global Forum on Agricultural Research (GFAR) will ensure that the plan and strategy are addressed at global and regional levels to governments, national policy makers, senior managers of agricultural research systems and Institutions, farmer organizations and cooperatives, Non-Government Organizations, Civil Society Organizations, Universities, Private Sector Enterprises farming and investors, donors and philanthropic organizations. The Conference is expected to usher in change that will reshape agricultural research to AR4D and innovation and improve resources for AR4D. GCARD is being organized by the Global Forum on Agricultural Research (GFAR) in collaboration with the Consortium and Independent Science and Partnership Council (now being formed) of the Consultative Group on International Agricultural Research (CGIAR). The Conference will replace both the GFAR Triennial Conferences and the Annual General Meetings of the CGIAR.

2.1 Objectives of GCARD

The objectives of GCARD are to ensure that:

- AR4D outputs are accessible and relevant to the poor in developing countries;
- Research focuses on the right questions and is driven by the AR4D needs of the resource-poor small producers;
- Knowledge generation through AR4D is embedded in development thinking and practice;
- Funding systems are aligned between research and development;
- Effective innovation pathways are developed between diverse stakeholders;
- International agricultural research systems are effectively integrated with regional and national partners (NARS, public, private and civil society) and respond to national and sub-regional demands to help ensure development impact.

The GCARD is expected to add value to other processes where AR4D *needs* and *actions* have been identified and implemented. This is to be achieved by the following:

- GCARD attempts to identify researchable issues in agriculture that will have impact on development especially towards eliminating hunger and extreme poverty. The poor and smallholder farmers are central to the efforts being made towards applying science and technology for AR4D.
- The GCARD process is aimed to be inclusive of all stakeholders of AR4D innovation and as equal partners, following a bottom up approach.
- It aims for collaborative action among research systems globally, with all stakeholders as equal partners towards AR4D.

2.2 Organization of GCARD process

The GCARD is being organized by GFAR by reaching out to all stakeholders in AR4D, working through its constituent agencies and networks, such as: the six Regional Research Fora, which include, the Association for Agricultural Research in Near East and North Africa (AARINENA), the Asia Pacific Association of Agricultural Research Institutes (APAARI), the Central Asia and the Caucasus Association for Agricultural Research Institutions (CACAARI), the Forum for Agricultural Research in Africa (FARA), the European Federation for Agricultural Research for Development (EFARD) and the Forum for Agricultural Research in Latin America and the Caribbean (FORAGRO), which represent National Agricultural Research Systems (NARS) and Institutes (NARI); the Alliance of CGIAR Centres; FAO; IFAD; representatives of farmers organizations; civil society; the private sector; and donor agencies. For this, the GFAR Steering Committee has appointed a GCARD Task Force, chaired by World Food Prize Laureate Dr Monty Jones, to oversee the organization of the Conference and the consultations preceding it. The Task Force reports to stakeholders via the GFAR Steering Committee.

The elements involved in the GCARD consultation process have included:

- Regional reviews, which have now produced a summary of regional research and development needs within the global context of agricultural research.
- Electronic (e-) consultations at the regional levels by framing questions from the Regional Reviews at the regional levels which have also been concluded.
- Face-to-Face dialogues through workshops at the regional levels which have also been completed. These dialogues have provided diverse perspectives on the priorities for AR4D, working back from the desired development impacts to ensure that research & development are innovative and are focused on meeting development goals of the poor small producers and their communities.

2.3 The GCARD Conference

The Conference is being organized from 28 to 31 March 2010 in Montpellier, France to align diverse stakeholders in agricultural research around a common agenda and develop the linkages required for its delivery. During the 4 days of deliberations the conference will examine: (i) priority development challenges and the potential role of research in delivering desired development impacts, (ii) investment needs for AR4D systems, innovation and wide knowledge sharing of the successful integrated farming systems and will feature high level consultations and focus on policy changes, (iii) the ways to enhance South-South collaboration with specific

examples from the Successful farmers in each of the soil and agro-climatic conditions, (iv) to attract the recruitment of young people (v) the possible solutions and ways forward to address the challenges identified and the better ways in which AR4D actors can work together to achieve development goals.

The follow-up actions from the Conference will lay the groundwork for a reshaped global AR4D system with all stakeholders as equal partners, its action plan and strategy, as well as initiate new ways of working through global collaborative action. The policies, principles and practices to be included in the action plan will be further developed throughout 2010 into iterative cycles of learning, feedback, monitoring and repositioning with the full involvement of all stakeholders, following a bottom up approach (especially the successful farmers), culminating in a biennial GCARD conference. During these conferences all actions recommended by GCARD will be assessed.

3. The Resource-poor Small-holder Farmers and Producers

3.1 Importance of smallholder farmers in agriculture in developing countries

Agriculture is a source of livelihoods for estimated 85% of rural poor and provides for 1.5 billion smallholders and landless labourers. The vast majority of the farmers in the developing world are smallholders and an estimated 85% of them are farming less than 2 hectares (ha). Most developing countries in the world have a large population of small-holder farmers. In countries, as diverse as Bangladesh, China, Egypt, and Malawi, 95% farms are smaller than 2 ha, and many other great majority of small holder farms are less than 2 ha (World Bank, 2007). Moreover, 75% of poor people live in rural areas of which 2.1 billion live on less than \$ 2 a day and 880 million on less than \$1 a day, and most depend on agriculture for their livelihoods. Thus, promoting integrated sustainable agriculture farming system for them to meet their and their communities' nutrition and food needs is imperative for meeting the Millennium Development Goals (MDGs) of halving poverty and hunger by 2015.

3.2 Current situation of smallholder farmers/producers in the developing world

The revolution that dramatically improved crop production since the 1960s in the developing countries especially in Asia has now waned, experiencing stagnation or slowdown in agricultural production and productivity during the past two decades or so. Food insecurity and poverty, particularly rural poverty, accounting for two-third of the world's hungry and poor, exacerbated by the soaring food and fuel prices, global economic downturn, volatile markets and climate change-induced vulnerability, have resurfaced as the foremost development concerns. Fast declining and degrading land, water and biodiversity resources have further aggravated the problem. These changes and the manifold increase of input costs have had a severe impact on the purchasing power and net incomes of the smallholder farmers, thus adversely affecting their livelihoods and made them hungrier and poorer over the years.

These smallholder farmers/producers in the developing world are now poorer and cash starved, and most countries lack appropriate policies to address their needs. Much of the widely known

research outputs available due to international/national research efforts require use of high-yielding and fertilizer-responsive varieties, fertilizers, pesticides, herbicides and mechanization. All these require cash money which is most wanting with the smallholder farmers in majority of the developing countries.

High cost of production is an issue facing farmers in all the developing countries. Several are facing issues relevant to non-availability of these inputs locally and the associated issues on their imports. Taking India as test case where all agro-inputs are available in plenty and some of these are subsidized (as part of pro-active policy changes), situation is worsening since start of the 21st century, i.e., after at least 50 years of practicing the on-going 'green revolution agriculture' and the AR4D approach. Between the Census of 1991 and that of 2001, nearly eight million cultivators have quit farming in India. Another, more alarming fact is the widespread distress in farming sector. Its most disturbing symptom is the tendency of the smallholder farmers to commit suicide. Technically, there would be multiplicity of causes for such drastic situation, including decline in investment in agriculture. But when there are nearly 200,000 suicides among farmers in a single country, it makes sense to realize that the future of smallholder farmers in developing countries under the present situation looks bleak. This should force us, who are involved in the AR4D (in its present format), to understand as to what extent are we, the proponents of the 'Green Revolution', responsible for the situation and should we not take drastic steps to address it by changing the paradigm for AR4D.

The suggested alternative protocols of agriculture in the AR4D paradigm based on experiences as above need to follow environmentally friendly principle which ensures active involvement of communities and results in increased net income, purchasing power, employment and livelihoods for these farmers.

The "modernization" paradigm that assumes large-scale commercial farming as more efficient than smallholder agriculture has proved a poor guide for agricultural development policy. The productivity efficiency of large scale farming in South America is the same as small holder farming in South East Asia but generates more benefits for rural households and communities as reported in the Regional Review for the Asia Pacific. Smallholder farming or the 'family farming' remains the most common form of organization in agriculture, and it should be understood that following the local integrated farming system, using locally adapted species and varieties, substantially increases the net farm productivity of small farms and contribution to the GDP of countries, agriculture growth, development and poverty reduction. Therefore, smallholder farmers assume special importance if agricultural development and growth are to be achieved, and there is an urgent need for agricultural development that would ensure improvement of the livelihoods and thwart their hunger and poverty of the majority of the developing worlds. Needless to emphasize, this warrants an urgent attention, action plan and budgets developed in consultation with all stakeholders as equal partners.

It is also widely realized that agricultural research for development (AR4D) alone will not be enough to thwart their hunger and poverty. They need application of science and technology along with other development efforts including access to low cost finance, equitable markets, roads and transportation, institutions, education and learning, etc. There is also a need to more

socially-owned system of policy formulation and a new model of agricultural policy guided by the participation of farmers and consumers.

4. Actions Required to Improve the Livelihoods of Smallholder Farmers

4.1 Challenges for Agricultural Research and Development in the Regions

Of the challenges at the global level, challenges, namely, food security (for alleviating poverty and hunger and to meet the increased food needs); protecting environment through natural resource management (biodiversity, soil, water, rangelands); efficient land and water use; climate change; optimizing land use following the local farming systems that are sustainable, animal/plant/human health and food safety; and nutrition (malnutrition, and human health) are relevant and important challenges for all the regions of the developing world. The energy security in most of the regions, however, may be a major challenge in the future.

The review of the reports of the regions indicates that agriculture sector is presently facing many problems and challenges that have been caused by the NARES' inability to deliver. The task has been, and continues to be, for NARES to address the needs of the smallholder farmers and rural poor to improve their livelihoods, and to meet the AR4D goals of the countries in all the regions them to make the agriculture sector sustainable and more responsive to the needs of small holders. Based on the review of different reports of the regions, six major challenges have been identified:

1. Food, nutrition and health security
2. Increasing the net incomes and purchasing power and improving livelihoods
3. Protecting the environment
4. Achieving structural reforms of the ARSs, education and extension
5. Meeting the special challenges
6. Making ARSs inclusive and follow a bottom up approach

4.2 Important feedbacks/messages received

The GCARD review process in each of the five regions of the developing world has helped in providing important feedbacks and in identifying the priority needs for AR4D. The important feedbacks/messages received are:

- Needs of the resource-poor smallholders not well addressed by the ARSs mandates in the past.
- Inability of majority of resource-poor farmers to adopt high-input, high-cost, high responsibility and high-risk green revolution technologies, a fact which was not internalized in the past research agendas.
- Vast knowledge base and experience of successful farmers having high net productivity using eco-friendly approaches, without external inputs, ignored.
- Underinvestment in Agriculture & AR4D, particularly integrating horticulture, livestock, fisheries with crops, especially in rainfed, mountain and dryland areas, socio-economic

and NRM research, maintenance research and local capacity building. Thus, assure greater investments in and support to AR4D, education and extension.

- Most regions need a lot of assistance in restructuring and strengthening national AR4D, education and learning including at schools and community levels and extension (successful farmers of each area to train and work with school drop outs as general practitioners in agriculture -GPAs) systems (NARES) and ensure inclusiveness of all stakeholders (the producers such as through Producers' company or PCs and effective cooperatives -), Civil Society Organizations (CSO) and the successful farmers in the area with equal partnerships supported by the ARSs located in the area and International organizations such as CGIAR, FAO and GFAR. Also, the encouragement of linkages among the ARD stakeholders at the national, regional and global level must be done by GFAR.
- Insufficient attention to frontline issues such as climate change adaptation, uncertainty and vulnerability, scarcity and declining quality of sub soil water and soil, agro-biodiversity erosion, increasing biotic stresses, increasing threats of bio-insecurity, meeting the nutrition, food and health needs of the poor small producers and their communities, market volatility and income divides.
- Develop favourable policies (creating employment opportunities in rural and mountainous areas with school drop outs being trained as GPAs), the PCs to plan production to meet the needs of their members and their communities and at farm gate prices, and ensure nutrition, food and health security, increasing net income, purchasing power and livelihood improvements and land tenure and property rights) to create a favourable policy environment by investing more in the rural and mountainous areas.
- Besides fighting chronic hunger, malnutrition and poverty, synergizing productivity, sustainability and inclusiveness, producers' company and successful farmers' interventions for closing technology transfer gaps at various levels, thereby strengthening linkage of farmers with markets and value chain were identified as other key drivers for AR4D.
- Address socioeconomic issues especially gender/women-related issues considering their significant contribution to agriculture in the developing countries.
- Prioritization exercises need to explicitly target the poor for the complementary approaches and policies and also of increased funding to support action research in partnership with the smallholder farmers in order to avoid under funding of their needs. Ensure that the prioritized researchable issues are addressed by the NARS in partnership with all other stakeholders of AR4D.

4.3 Priority areas of AR4D identified

The GCARD review process in each of the regions has helped in identifying the priority needs for AR4D which could be grouped into following categories:

(i) Institutional issues: Agricultural extension followed by action agricultural research, education, linkages, partnerships and collaboration.

(ii) Research issues: Improved know how on the local integrated farming systems, focusing on the seasonal sustainable crop to increase net production; Water and irrigation management;

Research on integrating Crop, Livestock, Horticulture, Medicinal, Aromatic and Dye Plants (MADP) farming systems; Seed systems; Forestry/agro-forestry; including in rangelands and Mountain agriculture.

(iii) Policy issues: Need for greater investments in agriculture and AR4D (including agricultural research, education and extension for meeting the needs of the poor small producers) was the most important, followed by marketing locally/ vicinity of agricultural produce and products and developing suitable AR4D policies for problems such as low and stagnating productivity and unsustainable production of the poor rural small producers, widening rural–urban and farmer–non-farmer divides, chronic hunger and poverty, natural resource depletion, and provision of environmental services. Agriculture should be lead by integrated policy and planning, linking planning between line ministries in the States directly with the PCs, staffed by professionals, set up by the poor small producers.

(iv) Environment protection and management issues: Declining and degrading land, water, biodiversity and other natural resources, challenge of climate change and desertification.

(v) Socioeconomic issues: Attention to gender/women-related issues, and livelihoods analysis.

5. Actions Required to Improve the Livelihoods of Resource poor Smallholder Farmers

5.1 Research should focus and target the resource poor smallholder farmers

The AR4D must target the smallholder farmers in all the three worlds of agriculture, i.e., i) agriculture-based, ii) transforming and iii) urbanized (World Bank, 2008). **The agriculture-based countries** require a revolution in smallholder farming; replicating the successful local eco-friendly sustainable farming systems and optimizing their land use to meet their own needs and achieve their development goals. **The transforming countries** comprise the second category whose agriculture contributes less than 20 percent of the GDP, but employs nearly 55 to 60 percent of the workforce. These countries are transforming fast and the group is generally characterized with rapidly rising rural-urban income disparities with serious social and political implications. The developed countries or transition economies comprise **the urbanized world of agriculture**, whose agriculture contributes only about 5% of their GDP. The AR4D must focus on the smallholder farmers in the first two categories in order to improve their livelihoods and increase the GDP contribution.

5.2 Research should have a development focus

The feedback from different regions also emphatically stated that the research should have a development focus, and should be:

- Successful Farmer-driven and in partnership with NGOs and Agricultural Research Systems (ARS) at the local, national, regional and international levels.
- Directed at the needs of the poor/vulnerable small farm holders.
- Intimately linked to farmer-to-farmer learning.

- Focused on the most prominent (successful) farming system of each area and that facilitates replication of successful experiences by farmers of the area.
- Based on identification and promotion of agro-technologies that are environmentally benign and which can reverse the negative fallouts of conventional agriculture, re-empower farmers, and ensure quality and sustainable levels of yields.
- Based on agro-ecology as a scientific basis, with local successful knowledge as a starting point.
- Fully inclusive of women, indigenous peoples and other under-represented groups.
- Producing outputs that are not privatized and that remain in the public domain.
- Embedded in a larger context of policy development that emphasizes poverty reduction, especially in rural areas.
- Scaled-up to bring large numbers of farmers back into the fold of low cost farming systems of the area, producing inputs on farm to increase net income and purchasing power. This would require policy and developmental support from governments and multilateral institutions.
- Directed at nutrition, health and food security, especially in marginal/vulnerable environments, where the poor live, and guided by concerns of national food sovereignty, right to nutrition, health, food and equity.
- Based on full and real participation of small farm holders and CSOs in priority-setting, agenda formulation, research collaboration, governance and decision-making in partnership with ARS.
- Focused on issues of resource access for poor people, e.g., land, water, genetic resources as adapted to the local area.

5.3 Elements of action plan

5.3.1 Focus and target AR4D on smallholder farmers

In agriculture-based and transforming economies of the world, there is no greater engine for driving growth and thereby reducing poverty and hunger than investing in agriculture, complemented by programmes that assure people to claim their entitlements. Thus, considering the importance and present situation of the smallholder farmers in the agriculture of developing countries, it is highly important and urgent that the focus and target of AR4D now focuses on meeting their needs.

5.3.2 Agreed and proposed action research targets the identified priority areas of research and development

The next step after identifying the priority areas of AR4D in consultation with the poor smallholders, the social scientists (CSOs) in the regions and the successful farmers assisted by the ARSs would be to ensure that the agreed and proposed action research targets the priority areas of research and development which will lead to sustainable agricultural development and improvements in the livelihoods and sustainability of smallholder farmers.

5.3.3 Action for institutional issues

- **Agricultural research and education system**

- The most important thing to do on priority basis for AR4D is to heavily invest in training, AR4D and education to improve the existing infrastructure and to create the required new infrastructure on successful farmer fields and the PCs or Producers Cooperatives. Efforts by all the stakeholders of AR4D must be made to mobilize political support to achieve this objective. It must be emphasized that the returns for investments in agricultural research, education and development in countries, where agriculture is a key element of the livelihoods and welfare of the rural populations and significantly contributes to national GDP, are well documented and accepted internationally.
- There is also a need to improve agricultural research and its innovative systems in accordance with the new rapid developments in agriculture sector of the developing countries. These will include (i) Reorientation of AR4D to satisfy the needs of smallholder producers and mostly producing to meet their own and their communities' needs, ensuring that the system becomes more inclusive in the research cycle, contributing to agricultural innovations at national, regional and even global levels, (ii) Reforms in the structure of the research system, especially its accountability and reward systems, so that it can attract active, young people with skills and capacities for modern research to global standards, and (iii) Increased investment in local infrastructure for primary and secondary value addition and storage to zero post harvest losses and marketing when prices peak. This will also require changes in funding AR4D.
- There is a definite need for capacity development for effectively carrying out and achieving the set objectives of the agreed AR4D needs. It involves developing good infrastructure (buildings, facilities, equipment, etc.) for action research on successful farmer fields and building local capacity (secondary school drop outs) of the professionals and technicians to carry out the required research activities to accomplish the set research objectives on successful farmer fields. The research areas that need special attention are: local and under utilized plant genetic resources conservation and utilization by the producers; disease-resistance by conversion to the local successful farming system; establishing locally adapted farmers' empowering seed systems; sustainable (including conservation agriculture); salinity management; agricultural engineering and farm machinery/tools relevant and friendly to small holder/producers; policy and marketing reforms (with focus on meeting the nutrition, health and food needs of the producers and their communities through PCs or improved Producers' Cooperatives)); competitiveness by optimizing the land use; adoption and impact assessments.
- Restructuring of the agricultural research system to AR4D may also necessitate creation of an apex body in each area to effectively optimize the local farming system given the funding, training of trainers (TOTs), education and setting up by the smallholders/producers their PCs or improves Cooperatives, staffed by professionals, to take over the

risks and responsibilities, other than on farm activities, bring the producers core competence, provide the extension, finance, logistics, marketing and other need based services. The advantage of having an intervention of such an organization has been amply demonstrated in many of the developing countries.

- The changes in research system would also involve strengthening innovation in agriculture using innovative approaches for each of the regions as practiced by their successful farmers. This would mean local capacity building for AR4D, policy and investment, revamping farm delivery support systems, locally adapted farmers' empowering seed systems, water (moisture) conservation and management systems, land asset reforms especially around lease of land to small holders, Intellectual Property Rights, farmer organizations (PCs or improved Producers' cooperatives) and ushering in new forms of farmer aggregation, etc. This may also necessitate restructuring/organization of the existing research institutions/agricultural universities and modification of their research, education and extension mandates.
- Action may also be required in introducing the integrated coordinated research improvement programs for each of the soil and agro-climatic areas, over seen by the successful farmers and assisted by senior scientists/professors belonging to the local ARSs/Agric Universities. Such arrangements have paid heavy dividends in some of the developing counties that have used such changes. Changes would also envisage empowering the civil society organizations (farmers organizations, NGOs, women' organizations, private organizations, agri-universities, etc.) to play a lead role in deciding the national, regional and global AR4D goals.

- **Agricultural extension and advisory services**

- It is now imperative that an effective extension system is put in place in all the countries of the regions which would help the farming community in more than one way. The new system would also need to develop an appropriate extension system that links to agricultural innovation systems and support smallholder agriculture and market participation. Thus, there is an urgent need to establish institutions to facilitate transfer new innovations to farmers for their use. These may include local 'Farm Advisory Services Centers' at district levels which would be staffed with trained GPA personnel and headed by a successful farmer of the area. There is also a need for a greater use of ICTs and for transforming extension for the emerging needs in AR4D. Special attention should be given to train extension agents to improve their capabilities and to make them efficient links between Government agencies and the farmers. To achieve all this, it is essential that the governments of different countries in the region make greater investments in extension system by creating local capacity (school drop outs), a point which has been emphasized earlier as well.

- **Linkages, partnerships, collaboration**

- In additional to strengthening the research systems at the local national level, linkages, partnerships and collaboration among them have to be developed at the

- national, sub-regional, regional, inter-regional and with the global research systems considering the merits of these linkages. Issues that have been identified as important include linkages, partnerships and collaboration at local, national, regional and international levels; among government, private entrepreneurs, donors and beneficiaries; between MoA and other ministries and research and education; among different counties and their research and educational institutions in common interest areas; and with international organizations and donor agencies.
- The linkages, partnerships and collaboration mentioned above are important and, therefore, it is important to establish and formulize these through the government channels and requirements to make them officially recognized and sustainable. At the national level, effective linkages and partnerships are required between research, education and extension and also with different AR4D stakeholders and among different research institutions. Joint sub-regional/regional actions could address and provide good solutions to complex natural resource management problems and trans-boundary domains (hydro-salinity, rangeland management, livestock production, water-use efficiency, sustainable agriculture, managing diseases and pests through eco-friendly approaches without compromising on productivity per unit land, mechanization/tools for small-scale farming, climate change, and issues relating to vegetables and fruits and biodiversity.

5.3.4 Action Research for Development Issues

- **Improved technology for sustainable production**
 - Agricultural research, technologies and innovations must lead to the development of technologies rooted in the principles of economics, equity and environment to increase quality, net productivity, income, purchasing power and livelihood improvements in perpetuity. Technology and innovation systems that are changing rapidly must go well beyond just raising yields and should be dynamically geared to meet the challenges of increasing resource scarcity and the structural transformation of the economic and social role of agriculture. Notwithstanding the centrality of generation and transfer of new and improved technologies for attaining sustained quality, productivity, net incomes and purchasing power gains, professionals are thus called upon to address also the new challenges of market volatility, soaring food and energy prices, economic downturn, deteriorating soil-health, ever increasing cost of production and global climate change. Generation of relevant technologies and innovations should be rooted in the goals of poverty alleviation, economic growth and environmental conservation.
 - Production of seasonal crops as a focus of the local farming system should be considered a high priority in the regions to achieve nutrition, food and feed security. In the regions, there is enormous potential for sustainable production by wide scale replication of the successful farming systems. The key researchable issues identified is the conversion of crop production as a part of the integrated farming systems of the area involving fruit trees, animals and MADPs , making it stress-tolerant by using improved locally adapted varieties of improved seed and planting material, integrated pest management with bio-intensive approaches , soil health and sustainable agriculture.

- It is important to identify and prioritize the farming systems that have the highest potential for growth and poverty alleviation. It is also to be realized that livestock and horticultural crops are integral parts of most of the farming systems (Weatherhog et al., 2001). Globalization provides comparative advantages to adopt the local integrated farming systems, geared to first meet the needs of the poor smallholders/producers and their communities, with a focus on surplus horticultural, livestock, and fish products to meet the demand of markets and urban areas in the vicinity. The increasing urbanization forecast in future and the increased demand for off-farm employment may require increased training for optimization of land use, production systems and post-harvest on farm management using the intervention of PCs or improved Producers cooperatives.
 - It is also important to enhance the sustainable productivity of agriculture in the rainfed/ 'less-favored' or 'lagging' areas while protecting the natural resource-base. Thus, conversion to the local farming systems, incorporating fodder crops and management of soil erosion will protect the natural resource base. With the conversion of these areas to follow eco-friendly principles, will ensure water resources are managed more efficiently from basin level to farm level to avoid a "water crisis" over major parts of the rainfed regions. Bringing fruit trees and animal components on the cropped lands as improved alley cropping will help drought proofing the rainfed areas.
 - Productivity and production of crops could be substantially improved, provided action research on following eco-friendly principles, integrating the production of different cereals, fruit, fodder and vegetable crops and to optimize land use is mandated.
 - It is important to lay greater emphasis on farmer friendly knowledge and technology adoption. It should be recognized that the scaled-up impact of technology and innovation systems on accelerated and inclusive development depends on more knowledge and technology adoption. Like technologies generation, the adoption of technologies and innovations should also be rooted in the goals of poverty alleviation, economic growth and environmental conservation. The action research, farmers' empowering agro-technologies and innovation systems, both at national and international levels should be suitably adapted to help the knowledge and technology adoption.
 - It is important to use the successful integrated technology generated by local farmers. Greater knowledge and technology adoption depends on the integrated technology generated by the local successful farmers – underpinning the importance of socio-economic understanding, human resource capital and institutional support.
- **Livestock research including rangelands**
 - The changes in the quality of the diet due to rising urbanization population is expected to change with significant growth in consumption of meat, milk and dairy products, thus underpinning strongly the need for promotion of livestock sub-sector and synergistic linkages between crop/agro-forestry/livestock sectors for growth in agricultural GDP and poverty reduction.
 - The NARES, thus, need to pay much greater attention to production of animals with crops and trees for increasing productivity in small and mixed farm systems. In

- addition, animal feed supplies could come from large increases in cereal/fodder production and through trees with fodder value and integrated with crops. This should meet the nutrition, food needs of the smallholders/producers and their livestock; only surplus going to meet the urban demand. Needs of herders are special and require separate attention.
- There is a need to refocus on the locally adapted breeds and species of livestock for enhancing net incomes from them and sustainability of the communities. Intervention with PCs or the improved Producers' cooperatives will encourage scientifically and environmentally sound livestock farming and enhance milk/meat processing.
 - Similarly, work on rangeland degradation management, renewal and conservation, conservation of biodiversity and water access must receive much greater attention considering the importance of rangelands in livestock production.
- **Horticulture**
 - Many countries in the developing world have a rich heritage of different types of vegetables, fruits and vinery production and tremendous potential to develop horticulture, which is very important for providing nutritional security to the people in the region. There is always a huge local demand and also the capacity to compete in International markets. The researchable issues include integration of animals, vegetables, fruits and vinery, marketing, post-harvest handling on farm and primary local value-addition, local pest management system developed by successful farmers, farming following eco-friendly principles and community empowered improved seed systems. All these deserve special attention.
 - The identified priority researchable issues, indicated above, must receive urgent attention from the researchers and research administrators.
 - **Seed systems**
 - There is immense potential to develop proper seed systems in many countries of the developing world (in Africa, Southeast Asia, Pacific island countries, West Asia, South America, Central Asia and the Caucasus) for which there is huge scope and demand. The current seed systems in many developing countries are not well developed either in public or private sectors. The identified researchable issues include locally adapted seed production systems (public, private or community empowered), availability of improved modern seeds (cereals, potato, pulses, fruits, vegetables, forest plants and trees, etc.) and also locally adapted breed and species of animals and fish. These have been successfully demonstrated to work in some developing countries and the experiences need to be shared widely where they are not well developed. If given proper attention, the results of the work on the issues will certainly help improve net productivity and production of different crops and also animals and fisheries by the poor small holder producers.
 - There is an urgent need to take steps to address the identified researchable issues. First task is to encourage and assist in the development of local seed systems in the developing countries where they are not well developed (such as in Africa, Asia, Pacific island countries, West Asia, South America and CAC regions) as it will contribute to the sustainable integrated crop, horticulture, animal and fisheries production. Also, actions are required to establish seed delivery systems which would allow the availability of improved seeds and in the quantities required at proper times

and at a reasonable cost. The identified issues must receive attention of the researchers and research administrators.

- **Water resources and irrigation management**

- The important researchable issues include soil salinity, successful water conservation systems followed in each area, irrigation management, seasonal farming system crop management and diversification, particularly with locally adapted fruit trees.
- Similarly, crop management and diversification must receive a much greater attention than what they are presently receiving.

- **Forestry**

Forests are a valuable resource in all the developing countries. Now, signs of forest degradation are visible in most developing countries. Protection and sustainability of forests and encouraging agro-forestry becomes important in view of advancing desertification and climate change in the region, especially for meeting the bio mass requirements for soil and livestock feed. Considering this, there is an urgent need to protect forests from further degradation. The identified researchable issues include reforestation, forest trees/improved plant varieties, livestock and rangeland management, marketing of forest products. Areas in some countries (e.g. India) have linked tourism & recreation with setting up sustainable forests tourism & recreation. and following the conservation, development and harvesting system developed by the Department of Forests, Uttarkhand, India for the mapping of of forests should be considered for wider adaptation in other regions.

Concerted efforts are required by all to protect forests from further degradation and embark on appropriate afforestation and agro-forestry programs/campaigns in the region, using the local population. Attention needs to be paid on other researchable issues such as developing improved plant varieties for use in forestation and agro-forestry programs involving fruit trees. Marketing of forest products and tourism and recreation also deserve special attention. And so does marketing of non-timber products.

- **Mountain agriculture**

- Mountain areas support the livelihoods of significant proportion of the many developing countries' population. The productivity of the subsistence farming systems in mountains on sloping lands, mainly dryland, is low, thus, making the population as one of the poorest in the region. This, together with the harsh living conditions, promotes out-migration and land abandonment. Some selected crops (mainly barley and potato cultivation in many countries) and migratory small ruminant production are the main sources of subsistence to the population. Soil erosion by water run-off, managing sloping lands and degradation of grazing lands are major problems. The important researchable issues identified for the mountains include access to inputs (improved seeds/saplings/breeds, livestock droppings, biomass for soil health and cattle feed, fodder, small farm machinery/tools, credit through PCs or improved Producers' cooperatives), soil erosion and conservation, sustainable agriculture, crop rotation following local successful farming systems, post-harvest primary value addition on farm, local secondary value addition to zero

- post harvest losses, warehousing for storage to market when prices peak, marketing, and access to knowledge and extension services.
- Serious attention to mountainous agriculture is required in all the mountainous countries in the region to improve the livelihoods of their people. Sincere actions are urgently required by the governments and the donor countries/organizations to attend to the important issues in these areas to ensure overall development of the mountainous areas. To achieve this, research/development work on resource conserving, optimize land use, support for the production of inputs on farm including small farm implements and machinery, assistance in post-harvest primary and secondary value addition and marketing at farm gate prices to the producers and their communities and access to knowledge and extension systems. There would be a strong need for activities on diversification of income sources. All this means that the task is huge but achievable.

5.3.5 Effecting necessary policy shifts

- **Agricultural development policies**

- The important issues that have been identified in agricultural development policies for different regions include low investments in agriculture; land tenure, access, ownership and land-related issues; promotion for availability of small farm machinery/tools; marketing policies for agricultural produce; and creating income diversification opportunities in community centric community empowering manner.
- The prerequisite for achieving success in important policy-related issues is to design suitable agricultural policies and decision-making processes that empower communities. These include low investment, non-sustainable production, low and stagnating productivity, widening rural–urban and farmer–non-farmer divides, stubbornly high hunger and poverty and natural resource depletion must be addressed where possible with the intervention of the PC, assisted, supported and funded by the public sector.
- It should be remembered that the policies should be designed to suit the country's socio-economic conditions - however, the best possible policy issues for different governments of different regions would include (i) increase investments in agriculture (including research education and extension) and rural sector, (ii) increase the assets of the poor households, (iii) make farm households and increased net income from agriculture, following integrated local farming systems with high net farm productivity, and (iv) create opportunities in the rural non-farm economy for the farmers and rural poor to first produce to meet their own needs and at farm gate prices, thereby increasing their purchasing power, surplus to markets in the vicinity through PCs or improved Producers' cooperatives .
- In order to face the challenge of nutrition and food security, inclusiveness and climate change, Governments will need to follow a bottom up approach, make necessary changes/adjustments to policies, restructure institutions, provisions for the funding of PCs or improved Producers' cooperatives and infrastructure, valuing the services provided by them. The true value of the role of agriculture development in rural areas is to bring sustainability to the poor rural small producers, poverty alleviation and provision of environmental services, needs to be duly recognized and coherent policy

options and actions for governments to adopt and implement in partnership with all concerned departments and stakeholders. Agriculture should lead to integrated policy and planning, linking planning between line ministries and the PCs or the improved Producers' cooperatives set up by the poor small producers. This will allow the definition of appropriate policy objectives within the agricultural sector and resource allocation.

- The most important policy issue is to increase investments in agriculture, rural sector and AR4D, without which progress will not be possible. For this, there is an urgent need to strengthen the advocacy role which presently is weak. Best results could be achieved by reaching the policy makers in developing countries outside agriculture, e.g. planning, finance and rural development ministries and other sectors dealing with science departments. This is achievable by mobilizing the political support in which different stakeholders of AR4D in the countries of the regions and also the international organizations dealing with AR4D. The ideal solution being the creation of a Ministry for poor small producers and rural development.
- Land tenure, access, ownership are other important issues that need attention and it is now time and need for all the countries to make reforms and develop legal frameworks on land tenure, access and rights to the properties, where they do not exist, especially as the locals are the best guardians of these national assets. Land ownership is known to go a long way in providing stability to the small farm holders, and helps land improvements and their protection from land degradation.
- It is also important to adopt policy actions that would make farm households convert to and follow the local successful farming systems for higher net farm productivity. This would mean developing opportunities for the farm households to be more productive by providing them training and opportunities for exposure to successful farming systems in the vicinity, imparting different skills (e.g. for value addition to their products) so that they could diversify their household incomes. Likewise, agriculture must be made more productive by improving their net farm productivity by enhancing diversity in farming systems. For this, the governments in the region will have to ensure investment to make the availability of inputs including the local species of cattle essential for on-farm production of inputs, improved seeds, soil fertility and health and small machinery/tools to the smallholder farmers. And above all, the governance of agriculture would have to be poor small producer friendly.
- There is also a need to create opportunities for the rural and mountain non-farm economy for the rural poor to improve their skills and capabilities so that they are able to supply products to the modern food markets in their countries and the region. This will require increasing access of the rural and mountain poor to assets, improving the asset use by creating and supporting rural institutions for competitiveness with emphasis on territorial development to improve the non farm economy, and providing social assistance. This will also require improving the skills of the farmers to provide them access to the jobs in the new non-farm economy.

- **Marketing of agricultural produce/ products**

- The country governments in different regions now should develop suitable policies for producing to meet the producer and their communities, surplus if any to markets

- in the vicinity and when prices peak. These should include reforming trade, price and subsidies, bringing agriculture to the consumer/ markets and support smallholder competitiveness through institutional innovations (innovations through of science and technology). The small farmers will need to be organized and prepared by providing the required support and guidance to develop new products to supply the demand of the new food markets that are fast emerging.
- In addition, policy issues on micro planning and budgeting for agriculture to meet the local, area and national needs, to focus on providing farmers funds and the services of professionals on quality, safety, knowledge, financing and market-related information, price information, and to build and staff their cooperatives and small enterprises.
 - Follow eco-friendly principles and focus on primary and secondary value addition locally, which would ensure substantially reducing post-harvest losses, marketing when prices peak and thus substantially higher contribution to GDP.

5.3.6 Environment Protection Issues

- **Reduce agriculture's large environmental footprint and overcome the challenge of climate change**
 - The regions in the developing countries may be affected by the climate change (notably higher temperatures), greater rainfall variability and more frequent extreme weather events, including floods and droughts. The reduction in water availability and increase in animal and plant diseases will primarily affect poor countries and the small island states that have reduced capacity of response to adapt and remedy against the negative impacts.
 - To successfully face the problem of climate change, a better understanding of the effects of climate change on agriculture would be required. Also, measures for adaptation to the climate change will have to be developed for plant and animal production, which will involve development of new plant varieties and agricultural practices that integrate trees, animals and crops on a given field. Good agricultural practices such as eco-friendly, sustainable agriculture would contribute considerably to climate change adaptation and mitigation. Critical levels of water availability in most developing countries of the world due to agriculture have either reached or would reach soon requiring investments for water harvesting and maintaining the water table and meeting the day to day needs.
 - The regions would also need to be prepared for the mitigation measures to handle the ill effects of climate change.
 - Similarly, desertification is a major issue in many parts of the developing world such as in Africa, parts of Asia and Central Asia, which in the latter is associated in certain ways to salinity and water-use issues. If not addressed properly, it can have devastating consequences in reducing the cultivated area and adversely affecting agriculture in the affected countries.

- **Protecting biodiversity degradation**

- Many developing countries have rich heritage of diverse field, vegetables, fruits, vinery and nut trees. In addition, there are diverse plant species in the rangelands of different regions. Efforts are required in germplasm documentation and utilization and assistance for conservation by the local communities.
- Similarly, efforts in breed characterization of the prevailing small ruminants in different regions have provided some very useful information and need be strengthened.
- Moreover, characterization of the prevailing biodiversity in range vegetation and its conservation is also important.
- For these activities, investments are required by the respective governments to support and facilitate this important work of conservation (both *ex-situ* and *in-situ*) of the precious plant genetic material for future use. Efforts on capacity building for collection, conservation, evaluation and utilization will be required.

5.3.7 Socioeconomic Issues

- **Gender/women-related issues**

- Rural women play a recognizably active and important role in small holder farming in most parts of the developing world. They also add to the income of their households by actively participating in the farming of their small holdings around their homes and selling the produce to local markets. This role contributes to achieving their household food, health and nutrition security and also to the urban food security. However, these women have no voice in the decision making processes.
- It is time to recognize the importance of women contributing to agriculture and the household income in the countries of different regions. Thus, there is an urgent need to help them organize and promote their role in agriculture and decision-making, including the role in setting priorities in AR4D. Since the women also play a significant role in marketing of farm produce in several regions they need to be trained in market-related issues to make them more efficient in marketing of their produce and dealing with the traders in local markets.

- **Livelihoods and poverty analysis**

- It is recommended to study and analyze the livelihood patterns and the poverty levels in rural areas. This would facilitate actions on improving livelihoods and poverty.

5.3.8 Importance of development pathways

The GCARD consultation process has provided some very useful information on the priorities for AR4D in the five regions of the developing world. Now, the NARES are required to take steps to initiate actions to implement the prioritized issues. An important step in this would be to identify appropriate development pathways applicable, which could be adopted in different regions to get the desired agricultural development. This would require: identification of the requirements, need analysis, consideration of the existing successful models in the vicinity or design new models, test implement them through action research on farmer fields, evaluation,

advocating their replication and enlargement, and large-scale adoption. For this, changes in policy, structures such as local coordinating/regulating body, linkages, provide investments to the smallholders/producers for setting up PCs or improved Producers' cooperatives, local capacity development, new information platforms, etc. would be vital and should be provided.

5.4 Importance of an integrated approach

It is now internationally recognized that agricultural research alone has not been able to achieve required agricultural development and improve the livelihoods of the poor small farmers as shown by the worldwide experience of developing countries. There are a number of basic reasons for this situation. First, there are other essential elements together with the research that play an equally important role in the success of agricultural development and improving the livelihoods of farmers. Second, the NARES and the ARS have failed to take the lead on improving the livelihoods of the farmers and on poverty reduction. Third, there is lack of political will in the leadership of the developing countries to meet the AR4D needs of the poor small producers and their rural communities. What is now required is an integration from 'Field to Plate' by integrating all sub-sectors, field crops, horticulture, fisheries, livestock, agro-forestry, apiary, etc. and also for central infrastructure for secondary value addition, storage and local energy needs in rural areas. Therefore, an integrated approach must be adopted by the countries themselves if the desired goal of AR4D is to be achieved in the developing countries. The six essential elements which are important for ensuring agricultural development and improving the livelihoods of farmers are:

- Innovation and out of the box programmes in Research, education and extension,
- Making the local successful farming systems technology accessible to the poor small producers by contracting the successful farmers as resource persons,
- Develop and create a favourable policy environment including greater investments in AR4D focused on the needs of the small holder farmers and producers and bridge the "underinvestment gap" in rural areas and address the gender issues,
- Increasing farmers' assets with them setting up of the PCs or improved Producers' cooperatives, staffed by professionals, initially funded by the public sector,
- Increase net income, purchasing power, thereby ensuring sustainability and livelihood improvement of the poor small producers and their communities in rural areas, and
- Provide funding for setting up of and staffing PCs with professionals (school dropouts) to take over all risks and responsibilities other than on farm activities, for providing required services to their members for producing inputs on farm, procuring quality seed-planting material, etc., meeting working capital needs, assistance in optimising land use, primary and where possible secondary value addition on farm to increase shelf life of produce to zero down post-harvest losses, storage till prices peak and only then market the produce, logistics and the 'cash to cash cycle'.

Thus, an integrated approach by simultaneously ensuring the implementation of the above six key elements should result in achieving most of the MDGs, and possibly within five years from start up.

The six regions have good potential for AR4D in the immediate future. Considering the present state of affairs the regions could go two ways:

- Become self sufficient and meet their nutrition, health and food needs, or
- Become a potential hot spot for poverty because of: (i) shortage of irrigated land, (ii) shortage of water, (iii) adverse effects of agro-chemicals seed on their land and proportionate increased need of water each year and contaminating subsoil water, climate change and desertification, (iv) increasing population, (v) shortage of safe nutritious and quality food, and (vi) isolation of the world community by the net producers (Australia, Canada, and the USA).

Therefore, the following are of vital importance:

- Strengthening of the existing potential for knowledge creation
- Strengthening knowledge transfer mechanisms
- Developing collaboration, partnerships and linkages among different stakeholders of AR4D at the national, sub-region, regional and the global levels
- Focus on the poor small producers, particularly in rural and mountainous areas.

Considering the above and the potential that all the regions have, it is important that the governments make the required investments in and give the required support to agriculture and AR4D to meet the MDGs. Likewise, the international research and development organizations (CGIAR, FAO, etc.), the regional and international development organizations (IFAD, etc.) and banks (World Bank, Asian Development Bank, African Development Bank, etc.) must come forward to help the regions to ensure the needed funds for agriculture and AR4D to meet the needs of the poor small producers.

6. How GCARD can help the Smallholder Farmers?

Poverty and hunger, rising uncertainties about the availability of food at the global level due to growing population, concentration of smallholders and their poor communities, the health in rural areas, rising competition for land and water, ever-degrading environment – soil and water, uncertainties about future adoption rates for new technologies, trade globalization, and growing energy requirements are the major challenges that the world is now facing (GFAR, 2006; IAASTD, 2007; World Bank, 2007). It was emphasized that agriculture must address these challenges in order to fulfill its role in meeting the MDGs relevant to agriculture.

The smallholder farmers/producers, concentrated in the rural and mountains areas, are among the poorest communities in the developing world. Unfortunately, they have not received as much attention as they deserved in the past, a situation which still continues today. It clearly indicates that we have faulted in our AR4D planning, budgeting and approaches, which has lacked (i) the proper focus and emphasis on meeting the AR4D planning, budgeting, funding and extension needs of smallholder farmers/producers, (ii) the required focus on the local conditions and efforts for development (integrated approach), (iii) appropriate AR4D action plan (action research and bottom-up approach), and (iv) need based financial and political support by the governments of the developing countries.

It is realized that the contribution of smallholder farmers/producers is extremely important in the elimination of poverty and hunger, and thus, must be the focus of the AR4D agenda. It is now time to correct this situation.

6.1 What GCARD can do to improve the livelihoods of smallholder farmers?

A look at the six objectives of GCARD clearly indicates that it has to focus on the following:

- AR4D has relevance to the poor small producers in developing countries;
- Research focuses on the right questions and must be driven by the AR4D needs of the resource-poor small producers;
- Knowledge generation through AR4D is embedded in development thinking and practice, and that funding systems are aligned between research and development;
- Innovation pathways should be effective and developed between diverse stakeholders;
- International agricultural research systems are effectively integrated with regional and national partners (NARS, public, private and civil society) and respond to national and sub-regional demands to help ensure development impact.

It is very clear that the emphasis must be on the resource poor smallholder farmers in the developing world. The GCARD process thus provides an excellent opportunity to all the stakeholders of AR4D consultation process to discuss and propose the agenda required for AR4D, in the different soils and agro climatic conditions. We must utilize this opportunity to consider changing the world agenda for AR4D to meet the livelihoods improvement and wellbeing needs of the resource poor smallholder farmers/producers in the poor developing countries. Therefore, let us all look afresh at the AR4D agenda and, taking lessons from our past mistakes which have in the long run lead large numbers of poor small producers to remain poor and some being forced to committing suicide as in India, decide what and how it should now be done to improve the livelihoods of smallholder farmers/producers, who make up the majority of the worlds humanity.

6.2 What GCARD should do to help the smallholder farmers?

The GCARD, Montpellier, must keep the focus on the resource poor smallholder farmers/producers in the poor developing countries as stated in its objectives. It should ensure that the emphasis of the ongoing activities and those to be planned for future during the GCARD conference, should be to improve the livelihoods of the smallholder farmers/producers in the poor developing world. It should also ensure that an agenda of Action Research is adopted to effectively meet the goals of development.

The GCARD review process has indicated that there is a renewed interest in all the regions has been seen for attention and support to agricultural research and education in accordance with their agricultural development goals. GCARD should now play a catalytic role in energizing this renewed interest.

GCARD should play an active role in creating awareness in the world community; governments, donors, regional, international development agencies and banks, and international research institutions about the urgent need to achieve the goal of improving livelihoods of smallholder

farmers/producers in the developing world. It should go one step further of convincing the governments/policy makers in the developing world to invest much more in AR4D focused on small holder farmers and producers, including strengthening institutional resources for agricultural research, education, information and communication and linking research to development. This will be crucial for creating an effective system for AR4D and also help in developing favorable policy environment for supporting agriculture and AR4D in the developing countries,

7. What is expected from CGIAR in Science and Technology for meeting the needs of the poor Small holders/producers and their communities

7.1 What is expected from CGIAR in science and technology for smallholders

The following is expected from the CGIAR for the smallholder farmers/producers in the developing world:

- The CGIAR system should have its research focused on the right questions and be driven by the AR4D needs of the resource-poor small producers. This is of vital importance if the important MDGs of reducing poverty and hunger are to be achieved. Thus, it is implied that the technology that the system develops should, by and large, be friendly and applicable to the needs of smallholder farmers/producers.
- Research and innovation pathways of the CGIAR system should be effective and developed in close interaction with the diverse stakeholders as equal partners.
- Knowledge generation through AR4D is embedded in development thinking and practice, and that the funding systems are aligned between research and development.
- The CGIAR system is effectively integrated with regional and national partners (NARS, public, private and civil society) and responds to national and sub-regional demands to help ensure the development impact.

7.2 Urgent need to change the ARD systems, Institutions and processes

Considering the above expectations, the CGIAR should reorient its ARD system, institutions and processes so that it can effectively meet the expectations of the developing world. The ARD systems, institutions and process must focus on the poor smallholder farmers/producers if the poverty and hunger from the developing world is to be eliminated.

7.3 Some guidelines for CGIAR system

The CGIAR-SRF Report (2009) has identified three major issues of global concern, which include food, nutrition and health of for people, healthy environment for people and farmer empowering policy for people. In accordance with it the CGIAR should pay attention to these issues in the interest of the poor smallholder farmers/producers in the developing world. Some basic guidelines include:

- Need to reorient and focus its research agenda and mandate to meet the needs of the smallholder farmers in the developing world, e.g. developing farmers' empowering agro-technologies, and on-farm production of inputs.
- Direct its research and development efforts on the priorities of its mandated region(s) and as decided involving all stakeholders and through the GCARD consultation process.
- Focus research efforts with emphasis on improving local farming systems and not just commoditization, e.g., wheat, rice and maize. Efforts on creating diversified and sustainable integrated farming systems would have high buffering capacity to ensure increase in net incomes and purchasing power, sustainability of farmers' households.
- Focus on 'Action Research' that is inclusive of the needs for resource poor small holder farmers for their development.
- Technical support for setting up and promoting community-run rural seed banks as a major seed system in all the regions that should meet needs of seed and planting materials of small-holder farmers.
- Articulate science to traditional knowledge items and innovations by successful farmers in the different regions. And use the outputs in developing/enhancing farmers' empowering agro-technologies.
- Transforming and developing capacities in existing institutes, specializing in the soil and agro-climatic conditions of the area for helping the developing countries in strengthening innovation systems (action research, education and extension services, etc.) with representatives all stakeholders represented equally in its governance and actions, if AR4D is to succeed. Such institutions would also play an advocacy role for the importance of investments in agriculture and also help in creating awareness on the importance of agriculture in meeting development goals in the developing countries.
- Among its mandated regions, the CGIAR Centers should lay greater focus and emphasis on the regions that are underdeveloped and poorer and need greater assistance. The current International Centers focused around commodities, eco-regions, disciplines etc need to become focused holistically around farming systems, including livestock, fisheries and agro-forestry, of the region they are located in.
- Regions such as of South Asia, parts of South America and the Central Asia and South Caucuses, which have huge potential to contribute to solving a rapidly emerging global food crises but also the possibility of becoming agricultural, environmental and poverty hotspots, need as much attention as Africa. The CGIAR must focus on all such regions and sub-regions in addition to Africa.

8. Conclusion

This document has been contributed by a group of social scientists and ARD stakeholders, committed to facilitate the GCARD consultation so that it is inclusive of the opinion of all ARD

Stakeholders in contributing to increasing net incomes, purchasing power, livelihoods and sustainability of the poor small producers and their communities.

Of the 3 billion people that live in rural areas (nearly half of the humanity), nearly 2.5 billion are involved in agriculture and 1.5 billion (half of the rural area population) are resource poor small holders. Thus, these resource-poor small holder farmers and producers make a vast majority (85%) of farmers in the developing world. These farmers, concentrated in the rural areas and mountains, are among the poorest group of farmers in the developing world and become important in the context of eliminating poverty and hunger from the developing world.

[The Global Conference on Agricultural Research for Development \(GCARD\) 2010](#), to be held in Montpellier, France from 28-31 March 2010, should use this paper as the basis to develop an action plan and strategy for improving agricultural research globally in order to make maximum impact on development, especially for the poor small producers. This conference provides an opportunity to all the stakeholders of AR4D to discuss and decide the world agenda for AR4D. Considering the importance of poor smallholder farmers in the developing world, there is a need to utilize this opportunity to change the world agenda for AR4D so that livelihoods and wellbeing of the resource poor smallholder farmers/producers in the poor developing countries could be improved. This document, which has suggestions on the Action Plan that could be developed and approved at GCARD also briefly discusses how GFAR and CGIAR could help improve the livelihoods of the smallholder farmers in the developing world by increasing their and their communities net incomes and purchasing power and sustainability, aims to facilitate the consultation process at GCARD.

The document briefly discusses the importance and conditions of the smallholder farmers in the developing world, and emphasizes on the urgent need for action to meet the need-based funding, AR4D, extension, etc., to ensure that they are enabled to harvest crops in all seasons of the year. It discusses the challenges that have been identified in different regions of the developing world through the GCARD consultation process, which include: (i) Food, nutrition and health security, (ii) Increasing the net incomes and purchasing power and improving livelihoods, (iii) Protecting the environment without compromising productivity per unit land, (iv) Achieving structural reforms of the ARSs, education and extension, (v) Meeting the special challenges, and (vi) Making ARSs inclusive and follow a bottom up approach. In addition, it takes into consideration the exchanges of the E conference and the F2F, both being an important part of the GCARD consultation process.

Among the suggestions for Action Plan, the document lays emphasis that the AR4D should have focused on the smallholder farmers' development needs. Actions for different priority areas of research identified during the GCARD process in different regions are suggested. These include suggestions for (1) Action for Institutional Issues: Action research, and reorganization of agricultural research, education, extension and linkages and collaboration; (2) Action Research for Development Issues: Improved technology for sustainable production (livestock research including rangelands, horticulture, seed systems, water resources and irrigation management, forestry, fisheries mountain agriculture); (3) Effecting Necessary Policy Shifts: Agricultural development policies, and marketing of agricultural produce/ products; (4) Environment

Protection Issues: Reduce agriculture's large environmental footprint and overcome the challenge of climate change, and protecting biodiversity degradation; (5) Socioeconomic Issues: Gender/women-related issues, and livelihoods and poverty analysis.

The document also briefly discusses importance of development pathways and how the developing countries use them for the priority areas of AR4D. Finally, it emphasizes the importance of an integrated approach to fulfill the requirements for agricultural development.

It should be emphasized that the five regions in the developing world have good potential for AR4D in the immediate future. Considering the present state of affairs, the regions could either become self-sufficient and meet their nutrition, health and food needs, or become a potential hot spot for poverty because of: (i) shortage of irrigated land, (ii) shortage of water, (iii) adverse effects of agro-chemicals used on their land and thus the proportionate increased need of water each year and contaminating subsoil water, (iv) increasing population, (v) shortage of safe nutritious and quality food, (vi) climate change and desertification, and (vii) isolation of the world community by the net producers (Australia, Canada, and the USA).

Therefore, the issues that are of vital importance include: (i) Strengthening of the existing potential for knowledge creation, (ii) Strengthening knowledge transfer mechanisms, (iii) Developing collaboration, partnerships and linkages among different stakeholders of AR4D at the national, sub-region, regional and the global levels, and (iv) Focus on the development of poor small producers in rural and mountainous areas.

Considering the above and the potential that all five regions of the developing countries have, it is important that the governments make the required investments in and give the required support to agriculture and AR4D focused on meeting the needs of the poor small producers and their communities, which in turn would meet the needs of the poor small producers and their communities, which in turn would meet the MDGs. Likewise, the international research and development organizations (CGIAR, FAO, etc.), the regional and international development organizations (IFAD, etc.) and banks (World Bank, Asian Development Bank, African Development Bank, etc.) must come forward to help the regions to ensure the needed funds for agriculture and the relevant AR4D, with the specific undertaking that these be used to meet the needs of the poor small producers. The smallholder farmers/producers have been ignored for a long time and let us at this stage commit ourselves to help them to overcome their difficulties and improve their livelihoods.

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