ICARDA and International Public Goods (IPGs)

Introduction

The CGIAR has always focused on the production of international public goods, defined as 'research outputs of knowledge and technology generated through strategic and applied research that are applicable internationally to address generic issues and challenges consistent with CGIAR goals' (Harwood et al., 2005). For the first few decades of the CGIAR this mainly meant products of genetic improvement of the major world staple crops. However since the 1980's, the CGIAR began to incorporate environmental and poverty aspects into its work thereby increasing the scope and complexity of its mission and goals. Efforts in Natural Resources Management (NRM) gradually increased as its relevance became more important during the evolution of the CGIAR system particularly since the 1990's. More attention was given to production and the socio-economic contexts and to inter-disciplinary approaches.

In 1981 the CGIAR stated that its comparative advantage was in areas of strategic and applied research with adaptive research being more in the realm of national programmes and basic research more appropriately handled by advanced scientific institutions. Here strategic research was seen as mission-orientated basic research to discover the generic principles that explain phenomena or processes and applied research as applying generic principles and knowledge to generate improved technology or innovation. In the 1990's the CGIAR again emphasized the international nature of its research (TAC, 1990;1992) defined as 'activities that address significant global, continental or transnational problems'. However it was only in 1997, that IPGs were first stated explicitly by TAC (TAC, 1997) as a necessary condition for consideration in priority setting (Harwood et al., 2005).

What are IPGs within the CGIAR?

From the above it can be concluded that there are several types of IPGs produced by the CGIAR centres and its partners. These are listed below and include the recent attempts to clearly define what are the IPG's from Integrated Natural Resources Management research (INRM) (Harwood et al., 2005).

1. Gene banks and conserved germplasm, improved germplasm and plant and animal breeding protocols including biotechnology and genomics, intellectual property strategies.
2. Methods and tools for research for development that go beyond national boundaries including activities such as participatory plant breeding.
3. Global and regional approaches for INRM research coordination and facilitation services that involve more than one country.
4. Management and institutional building principles and methods for field and landscape scales that contribute to technologies and policies in more than one country.
5. Technology development for production systems including their environmental impacts, than can be used in more than one country.
6. Scientific understanding of socio-ecological system (agroecosystems) problems, their driving factors and their consequences and interactions with poverty and productivity that lead to extrapolable lessons for technology,

institution and policy interventions. These include the principles of managing agroecosystems across spatial and temporal scales.

7. Global information and knowledge systems.

This list emphasises that the CGIAR's work should be of an international nature and not solely confined to one country.

A recent paper by Ryan (2005) raised the issue of whether or not different criteria are needed to assess the IPG nature of germplasm research and natural resource management research. Ryan suggests that CGIAR centre activities and outputs are relatively easy to associate with IPGs but the process orientated aspects of the CGIAR's approach to Integrated Natural Resources Management (which ICARDA has been an active contributor to), which also address outcomes, adoption, responses and impacts, are considered to be less likely to result in IPGs. Ryan goes so far as to question the need for CGIAR involvement in, for example, improving the quality of partnerships among stakeholders at various scales. However he misinterprets the research process intended in the INRM approach. This involves both primary and secondary research (e.g. by focusing on productivity, human well-being and environmental conservation) that can result in the types of IPGs listed above as well as catalytic roles where centres stimulate additional investments by others to capture comparative advantages, facilitating roles where the activities of partners and stakeholders are made easier, and advocacy for additional policies or investments. Research on how to do research for development remains a legitimate area for the CGIAR and can be made more effective by expanding the traditional partnership base of the CGIAR system. Furthermore the CGIAR system is well placed to form bridges between location-specific research and national, regional and global development-related issues through its work on representative benchmark sites in different eco-regions.

In terms of the internationality of the CGIAR's work Ryan gives a useful clarification when he suggest that 'it would seem that where research activities are conducted is of little importance in terms of satisfying IPG requirements. It should not matter if they are conducted in one or many countries. What is important is that the expected outputs are intended to be relevant to as many countries as possible, with the intention of maximising international impacts via spillovers. Whether or not those impacts actually turn out to be international and pervasive is of less importance than that they were originally planned to be and verified as such by peer review'.

From the above brief excerpts from the debate it is apparent that to date there is no general agreement on the nature and extent of IPGs produced by the CGIAR. However with the stated focus of the system on poverty alleviation it does not seem reasonable to expect the research done by the CGIAR to be focused only on up-stream aspects and that some involvement at the local level is inevitable. The important point here is that such site-specific research engages multiple stakeholders and contributes to IPGs through a well-defined scaling out strategy and co-learning processes.

Given the close links among human welfare, agricultural productivity, economic growth and the environment in the dry areas, ICARDA's research is designed as a single coherent poverty-focused program, sub-divided into six MegaProjects, among which there are a multitude of cross-linkages and interactions. To focus ICARDA's

research agenda around the key problems of the Dry Areas, the MegaProjects have been designed with synergy to facilitate the research process and bring to bear the collective knowledge, expertise and resources available to the Center in tackling and solving the problems of the Dry Areas in the most effective and efficient manner possible. The six MegaProjects are as follows:

MP 1: Management of scarce water resources and mitigation of drought in Dry Areas
MP 2: Integrated gene management (IGM): Conservation, improvement and sustainable use of agrobiodiversity in Dry Areas
MP 3: Improved land management to combat desertification
MP 4: Diversification and Sustainable Improvement of Crop and Livestock Production Systems in Dry Areas
MP 5: Poverty and Livelihood Analysis and Impact Assessment in Dry Areas
MP 6: Knowledge management and dissemination for sustainable development in Dry Areas

The major IPGs of the ICARDA MegaProjects are as follows:

IPGs	MP1	MP2	MP3	MP4	MP5	MP6
	Water	IGM	Desert.	Diversif.	Poverty	Dissem.
Germplasm*	x	xx	x	x		xx
Practices	xx		xx	xx		xx
Knowledge	x	x	X	x	x	xx
Policy	xx		xx		xx	xx
Capacity	x	x	X	x	x	xx

* Categories of IPG from Science Council – Center Performance Measurement

ICARDA is keenly aware of the need to focus on the production of IPGs. Consequently we have developed a description, in the attached Annex, of the research approach to produce IPGs for the Center's entire research agenda by individual Output within MegaProjects for the period 2007-2009 within the context of the Center's Medium-Term Plan.

References

Harwood, R.R., Place, F., Kassam, A.H., Gregersen, H.M. (2005) International public goods through integrated natural resources management research. (In press)

Ryan, J. 2005. International public goods and the CGIAR niche in the R for D continuum: Operational concepts. (SPIA unpublished)

TAC (1990). A Possible Expansion of the CGIAR (AGR/TAC: IAR/90/24) TAC Secretariat, FAO, Rome.

TAC (1992) Review of CGIAR Priorities and Strategies (AGR/TAC:IAR/92/18.1) TAC Secretariat, FAO, Rome.

TAC (1997). Review of CGIAR Priorities and Strategies (AGR/TAC: IAR 96/6.1 and 6.2) TAC Secretariat, FAO, Rome.

ANNEX 1. ICARDA DRAFT MEDIUM-TERM PLAN 2007-2009

MP1: Management of Scarce Water Resources and Mitigation of Drought in Dry Areas

Outputs

Output 1: Assessment of available water resources, including precipitation, surface water, ground water and marginal water, and the productivity, benefits and costs at different scales (plant, field, farm, and basin) of their use in agriculture in the dry areas.

1.1 Output Targets

2007: Methodologies for assessment of agricultural water productivity developed and basin water productivity assessed in the river basins of Karkheh, Euphrates and Amu-Darya (*CP Water and Food*).

2008: Current and future quantity and quality of water resources available for agriculture in the dry areas determined and constraints to improved allocations identified in the project benchmark sites in Morocco, Egypt, Jordan and Iran (*CP Water and Food*)

2009: Water harvesting and supplemental irrigation potential and consequences completed for Central Asia

1.2 Research Approach to Develop International Public Goods

2007 Output Targets: The assessment methodology is intended to be a tool to evaluate basin-wide water productivity by researchers and practitioners and should be applicable at other comparable basins. Two approaches are adopted, the first is based on the already adopted techniques seeking other similar areas for out scaling and the other is using remotely sensed data with a pre set criteria to identify potential areas for using the two practices.

2008 Output Targets: The output will develop simple and rapid methodologies to assess cost-benefit analysis of water harvesting and supplemental irrigation practices and assessment of water productivity in the selected sites. This will be carried out through surveys, analyses and modelling activities. Outputs will be relevant across local and international scales. At local level, the emphasis is to inform NARS, decision makers, and national research and development agencies in benchmark countries. At international level, results will be analyzed to develop peer-reviewed international publication outlets for wider dissemination of the project results, especially for water scarce countries in the dry areas.

2009 Output Targets: The work will follow the same approach described above. The practices and systems however will be different and the criteria will be developed to assess the potential areas for the two systems. Special socioeconomic conditions in CA will be taken into consideration.

Output 2: Options and strategies for improved water productivity of rain, irrigation and marginal-quality waters in rainfed and irrigated systems through water harvesting, supplemental irrigation, agro management, and improved germplasm and cropping systems

2.1 Output Targets

2007: Methodologies and tools developed and verified for scaling out results from project benchmark sites on improved water productivity to other countries in the dry areas

2008: Technical management options for sustainable use of salt-prone waters and soils in agriculture are developed in dry areas of CWANA region (*in collaboration with IWMI*)

2009: Integrated technical packages that optimize water productivity in irrigated, rainfed and rangeland systems discussed and conveyed to NARS for adoption in CWANA region.

2.2 Research Approach to Develop International Public Goods

2007 Output Targets: On-farm field trials will be conducted to develop and verify the methodologies. Research results will be disseminated widely through community-based adaptive research. Research reports, pamphlets and peer-reviewed international publication will be published under the outputs to be available for all stake holders outside the benchmarks sites.

2008 Output Targets: In the process of developing soil- and crop-based management options for the use of saline waters and soils, field trials will be carried out in collaboration with NARS partners for applied research. The datasets collected from multiple sites will be analyzed to develop research reports, pamphlets, and peer-reviewed international publication outlets for wider dissemination of the project results to ecologically similar conditions throughout the dry areas for out scaling to the ultimate beneficiaries – poor resource-users.

2009 Output Targets: The approach used in the water benchmarks is a community based participatory and integrated approach which addresses an important IPG, increasing water productivity sustainably. The approach should result in methodologies and practices that are relevant across the dry areas. The nature of the water scarcity problem which is relevant to most of the countries in the dry areas makes the benchmarking approach and the tools to out and up scale to other dry areas a real opportunity to make impact in all these countries. The coverage of most of the environments and systems in the benchmarks and satellite sites makes the approach inclusive and comprehensive.

Output 3: Methods, options and strategies for drought characterization, preparedness and mitigation in the dry areas

3.1 Output Targets

2007: Network on drought management established and functioning

2008: Assessment of existing strategies, measures and policies (including indigenous knowledge and practices) for drought preparedness and mitigation. Options for drought mitigation and preparedness in selected countries developed

2009: Action plans using mitigation packages developed and approved for the countries members of the Drought Network

3.2 Research Approach to Develop International Public Goods

The Drought Network is international involving ICARDA, FAO and CIHEAM as international organizations serving dry areas and beyond. Most of the Members are public institutions or organizations concerned with public goods. The development of drought mitigation packages for the dry areas is dependent on special project funding to hire a scientist to lead project implementation. The project will adopt the same approaches used in the water benchmark project. Involvement of all stakeholders and particularly communities will ensure that packages respond to the needs. The network will be used to select issues relevant to the majority of the countries and to test solutions across countries. A framework for out scaling and up scaling will be developed to disseminate the output in similar areas. The NEMEDCA Drought net and the networks of FAO and CIHEAM in addition to other projects in the region will also be utilized. Meetings with policy makers to develop policy briefs to help adoption of the improved packages will be planned.

Output 4: Policy and institutional options for improved water use and irrigation demand management

4.1 Output Targets

2007: Methodologies for the valuation of scarce water developed and guidelines and recommendations for valuation by NARS in the project benchmark sites documented and disseminated.

2008: Alternative policy and institutional options for improved water demand management developed and communicated to NARS and policy makers

2009: Policy and institutional options for controlling groundwater overuse developed and communicated to NARS policy makers

4.2 Research Approach to Develop International Public Goods

2007 Output Targets: The output will generate general guidelines and recommendations for improved water valuation by NARS and CGIAR researchers in water scarce regions. This, along with the project benchmark sites, will be documented and disseminated to CGIAR and NARS researchers by research reports and peer-reviewed international publications.

2008 Output Targets: The output will develop and propose to policy makers through national consensus, improved policies and institutional options that will, if implemented, help improve water management and productivity. Outcomes will be relevant across the countries involved and more broadly to other countries with similar environments.

2009 Output Targets: Modelling with standardization of parameters will be adopted. The network of countries in the benchmark project will be used to develop common policies. Institutional arrangements will be based on discussion with the various countries involved. Modelling outputs will be of use more broadly in the countries involved and beyond to other parts of the dry areas.

Output 5: Enhanced human capacity to improve water use in agriculture in dry areas

5.1 Output Targets

2007: 25 NARS specialists trained in improving water use efficiency in marginal areas

2008: 25 NARS specialists acquire skills in drought preparedness and mitigation

2009: 25 NARS specialists acquire skills in improving water productivity in irrigated agriculture

5.2 Research Approach to Develop International Public Goods

ICARDA conducts on the job training, formal and graduate degree training. The training is associated with skills needed for conducting the research planned. The nature of the research as a producer of IPG reflects the training itself.

MP 2: Integrated Gene Management: Conservation, Enhancement and Utilization of Agrobiodiversity in Dry Areas

Project Outputs

Output 1: Genetic resources, including wild relatives of barley, wheat, food legumes (lentil, chickpea and faba bean) and feed legumes (vetch and grass pea) conserved *ex situ* with their genetic diversity characterized and documented and evaluated for some relevant traits

1.1 Output Targets

2007:

- Global database of wheat wild relatives and global inventory of barley genetic resources available on internet
- Collection mission in the Central Asia and Caucasus (CAC) region: collection mission in Georgia with focus on chickpea wild relatives and cultivated legumes
- Genetic diversity of composite subsets (4000 barley, 4000 chickpea,1000 lentil and 1000 faba bean accessions) characterized using molecular markers *(CP Generation*)

2008:

- At least 1500 accessions of wild relatives, landraces and advanced lines of wheat, barley, lentil and chickpea characterized for reactions to major diseases and insects
- Additional collection mission in CAC region – focus on ICARDA mandate crops and wild relatives
- Sub-sets of lentil and chickpea accessions collected from drought-stressed areas identified using GIS

2009:

- Focused identification of germplasm strategy for bread wheat and chickpea genetic resources developed and available on internet
- GRU herbarium with at least 10,000 items established, documented and the database available on internet
- Increased NARS plant genetic resources (PGR) capacity in CAC countries through assistance in strategy development, PGR *ex situ* conservation activities, including documentation, fund raising and training

1.2 Research Approach to Develop International Public Goods

All germplasm and information will be made freely available to NARS and researchers worldwide under appropriate agreements.

Output 2: Improved genetic stocks of barley developed through conventional, biotechnological and participatory plant breeding methodology and distributed globally through different mechanisms including International Nursery Network

2.1 Output Targets

2007:

- Identification of barley germplasm with high concentration of B-Carotene, iron (Fe) and zinc (Zn) and their utilization in breeding program (*CP HarvestPlus*)
- At least 100 barley elite lines produced and distributed to NARS worldwide
- Participatory plant breeding (PPB) for barley initiated in Algeria

2008:

- At least 500 doubled haploid lines of barley produced and evaluated in Syria for yield and quality
- At least two improved drought tolerant varieties of barley selected and tested in partnership with farmers, and which have proven farmer acceptability in Eritrea (*CP Water and Food*)
- PPB extended to farmers communities in Cuba and in at least two Asian countries (Laos and India)

2009:

- At least 50 barley lines with resistance/tolerance to salinity identified and distributed to NARS
- Barley germplasm stocks with single and multiple disease (scald, net blotch, yellow rust, and Fusarium head blight) resistance developed and distributed worldwide
- PPB for barley and wheat institutionalized in Jordan

2.2 Research Approach to Develop International Public Goods

The improved barley germplasm and knowledge generated with it will be made freely available to NARS, ARI, and barley researchers worldwide. The methodologies developed (Participatory Breeding and Breeding for stress prone environments) are being applied in barley and other crop improvement programs by ICARDA, NARS, ARI, and other CGIAR centers.

Output 3: Improved genetic stocks of bread wheat (winter and spring) and spring durum wheat developed through conventional, biotechnological and participatory variety selection methods and distributed in CWANA through different mechanisms including International Nursery Network

3.1 Output Targets

2007:

- Durum wheat mapping populations developed and QTLs established for grain yield, drought tolerance; and grain quality.

2008:

- High yielding lines of spring bread and durum wheat lines adapted to CWANA environments developed through an international partnership with AREO (Iran) and CIMMYT with special reference to stem rust race UG99 now prevalent in East African highlands with the capability to attack and devastate all current varieties of spring wheat in Nile Valley, West Asia and North Africa.

– International Trial data for spring bread and durum wheat analyzed for genotype x environment (GxE) interaction and environmental clustering

2009:

– Abiotic stress (drought, heat, cold) tolerant facultative/winter wheat and spring bread and durum wheat lines developed through international partnership with INRA (Morocco), MARA (Turkey) and CIMMYT.

– Recombinant inbred lines for resistance to stem rust race Ug99 developed and molecular markers probed.

3.2 Research Approach to Develop International Public Goods

Through a breeding methodology involving targeted crossing program that emphasizes selective use of locally adapted cultivars and wild progenitors, coupled with multilocation testing elite facultative/winter wheat and spring bread and durum wheat germplasm combining high yield and tolerance/resistance to prevailing biotic and abiotic stresses is developed. The developed germplasm is made available to national programs through ICWIP Wheat International Nurseries as IPGs.

In collaboration with pathologists, entomologists, and NARS, sources of resistance to the major diseases and insect pests limiting wheat production in CWANA are identified and assembled as gene pools. These include sources resistant to rusts (leaf, stem and stripe rusts), Septoria leaf blotch, Hessian fly, Russian wheat aphid and barley yellow dwarf virus. These sources are being used in breeding and made available to national programs as IPGs.

Recently, grain end-use quality has received greater attention regionally. Spring bread wheat adapted elite lines suitable for flat bread; raised bread and biscuits/pastry have been identified and durum wheat lines suitable for pasta, couscous and *burghul* processing are being used in crossing program as well as being made available to NARS as IPGs.

Efficient breeding methodologies for stress environments are developed through increased use of land races, wild relatives, and synthetics (durum wheat x *T. tauschii*) to broaden the genetic base for biotic (Hessian fly, Septoria blotch, and Sunn pest) and abiotic (drought, cold and heat) stresses in wheat.

Efficiency of breeding is enhanced through the use of stress physiology tools, biotechnology, including doubled-haploid techniques, MAS techniques, and efficient experimental designs and field plot techniques. Alpha lattice design, spatial analysis and biplot analysis are routinely used in interpreting and exploring genotype X environment interaction in multilocation trials. These new techniques constitute IPGs useful to NARS in CWANA.

Output 4: Improved genetic stocks of food legumes (lentil, kabuli chickpea and faba bean) developed through conventional, biotechnological and participatory variety selection methodologies and distributed to NARS globally through various means including International Nursery Network

4.1 Output Targets

2007:

– Experimental materials for the genetic and molecular analyses for Ascochyta blight and drought in chickpea; and winter hardiness and rust in lentil developed; and for chocolate spot in faba bean crossing initiated

– Efficiency of various designs using international nurseries data tested and best design/designs identified for use in lentils and chickpea
– Transformation technology and genetic engineering tools utilized to incorporate genes into food legumes

2008:

– Wide arrays of advanced lines and superior germplasm of lentils, kabuli chickpea and faba beans produced with disease resistance and cold and drought tolerance and high yield potential and distributed to all concerned NARS in CWANA and globally
– Segregating populations of lentil for high Zn and Fe distributed to NARS in targeted countries through International Nursery and other means
– The experimental materials of chickpea and lentil challenged with different stresses, and markers applied

2009:

– Superior lines with high Zn and Fe developed by NARS from the segregating populations of lentil crosses distributed to NARS in targeted countries
– Molecular markers identified for targeted traits in chickpea and lentil. Marker assisted selection (MAS) initiated for Ascochyta blight in chickpea and winter hardiness in lentil.

4.2 Research Approach to Develop International Public Goods

The major emphasis is on identification of sources of resistance to various biotic and abiotic stresses, identification of germplasm with different desirable agronomic and quality traits, and combining them in different genetic backgrounds as per the needs of the targeted NARS in different environments. The cooperative research to combine these traits through breeding results in the development of elite lines with adaptation to targeted environments, generation of new technologies or research methodologies, or new information of value across many countries. These outputs, which are the outcomes from joint efforts in collaboration with NARS, advanced research institutions, governmental and non-governmental organization, are freely exchanged among the partners and end-users and are International Public Goods.

Output 5: Improved genetic stocks of feed legumes (vetches and grass pea) developed through conventional, biotechnological and participatory varietal selection methods and distributed to NARS globally through various means including International Nursery Network

5.1 Output Targets

2007:

– Somaclone-derived grass pea for low neurotoxin stability and high grain yield developed
– Improved germplasm of forage legumes (vetches and chicklings) with desirable traits and high nutritive value developed and tested by NARS (S*ystemwide Livestock Program - SLP*)

2008:

– Grass pea germplasm forage types with high biomass and nutritive value identified (*SLP*)
– Improved germplasm of self-regenerating types developed for use in improving marginal pasture and grazing lands.
– Adapted and improved forage legume germplasm for inter-cropping with shrubs and trees (e.g., Atriplex, olive trees) developed and tested by farmers

2009:

– A strategy for client-oriented breeding developed through participatory evaluation at benchmark sites in Syria and Jordan (*SLP*)

– Package of technology including improved forage legume varieties, crop management, utilization and feeding systems developed and tested by farmers in marginal low rainfall areas (*SLP*)

5.2 Research Approach to Develop International Public Goods

Like most MP2 products, the forage legume varieties developed by ICARDA are available to all nations. These have wide, cross-national adaptation and hence constitute IPGs.

Output 6: Integrated pest management (IPM) control options including resistance sources, pathogenicity spectrum, and biological control mechanism against cereal and legume diseases and insects

6.1 Output Targets

2007:

– Wide array of germplasm of cereals, including wild relatives, evaluated for sources of resistance to diseases (wheat yellow rust, scald of barley) and insect pests (Sunn pest and barley stem gall midge).

– Subsets of crop wild relatives, landraces and breeding lines of legumes evaluated for resistance to diseases (Bean yellow mosaic virus, Bean leaf roll virus, chocolate spot, Chickpea Ascochyta blight and lentil Fusarium wilt) and insect pests (leaf minor in chickpea and Sitona in lentils).

– Effect of IPM components targeting control of major diseases (Ascochyta and Fusarium wilt in food legumes) and insect pests (Hessian fly) tested in hot spots, and IPM pilot sites established in CWANA

2008:

– Wide array of germplasm of cereals, including wild relatives, evaluated for new sources of resistance to diseases (barley yellow dwarf virus, wheat stem rust, Septoria, net blotch of barley) and insect pests (Russian wheat aphid, Hessian fly, and wheat stem sawfly).

– Virulence surveys and pathogenicity spectrum investigated. Variability of two virus groups (Potyvirus and Polerovirus), two fungal diseases from among yellow rust, scald, stem rust in cereals, and *Botrytis fabae* in food legumes, and one insect pest (Russian wheat aphid) characterized

– Effect of IPM components targeting control of major diseases (Ascochyta and Fusarium wilt in legumes) and insect pests (Sunn pest) tested in hot spots, and IPM pilot sites established in CWANA

2009:

– Subsets of crop wild relatives, landraces and breeding lines of legumes evaluated for resistance to diseases and insect pests.

– Virulence surveys and pathogenicity spectrum investigated. Variability one virus group (Potyvirus/ Polerovirus), two additional fungal diseases and one insect pest (Russian wheat aphid) characterized

– Effect of IPM components targeting control of additional major diseases and insect pests tested in hot spots, and IPM pilot sites established in CWANA

6.2 Research Approach to Develop International Public Goods

Effective resistance sources are published and germplasm are made available to NARS and ICARDA breeders. All technological packages developed are distributed to NARS research groups and extension, and to farmers' groups, and these are applied in many countries. As pests and diseases do not respect national borders, so knowledge and practices for their management is cross-national and are IPGs.

Output 7: Enhanced research capacity of human resources through training, workshops and conferences

7.1 Output Targets

Annually:

- Eight headquarters and non-headquarters specialized training courses in such themes as biotechnology, seed health technology, application of molecular markers in crop improvement, IPM, plant breeding, and genetic resources management organized each year
- Seven MSc/PhD graduate students complete degree program under ICARDA's co-supervision
- Individual non-degree specialized short training program organized

7.2 Research Approach to Develop International Public Goods

Our jointly-conducted research is published in international scientific journals and other media available to all.

MP3: Improved Land Management to Combat Desertification and Increase Productivity in Dry Areas

Outputs

Output 1: A holistic Integrated Natural Resources Management (INRM) approach for combating desertification developed and delivered to partners.

1.1 Output Targets

2007: Users adopt and adapt the INRM tools in projects of NRM

2008: Users adopt and adapt the INRM framework

2009: INRM researchers and partners develop their own INRM projects

1.2 Research Approach to Develop International Public Goods

The INRM approach is an IPG that features new knowledge, practices, policy and capacity building that can be used by NARS, NGOs, and CBOs. These outputs correspond well to the IPGs listed by Harwood et al. in 2005 for NRM outputs from the CGIAR centers.[1]

Output 2: Assessment of land degradation and development of multi-scale tools and methods to assess land degradation, (location, extent, driving forces, causes, impacts and consequences of desertification in dry areas)

2.1 Output Targets

2007:

- Assessments of causes, extent and risks of land degradation in five pilot areas in CWANA.
- A toolbox for rapid assessment of land degradation available.
- A conceptual approach for using multi-scale satellite products to estimate land degradation

2008:

- A draft multi-level framework and set of multi-thematic indicators of desertification.

[1] Harwood, R.R., F. Place, A.H. Kassam and H.M. Gregersen. 2005. *International Public Goods through Integrated Natural Resource management Research.* Draft paper submitted for publication. September 2005

– A methodology for monitoring drought.

2009:

– A final multi-level framework and set of multi-thematic indicators of desertification.

– Spatial drought monitoring products and guidelines for identifying hot-spots of water erosion.

2.2 Research Approach to Develop International Public Goods

The tools, approaches and methodologies as well the method of translation of the findings into coping strategies are IPGs. Thus the outputs are mainly knowledge, methods and capacity building. The research is done in selected countries of CWANA and at integrated research sites. Collaboration with other efforts towards the implementation of the UNCCD done by organizations such as FAO and ACSAD (Arab Center for the Studies of Arid Zones and Dry Lands) is on-going.

Output 3: 'Best-bet' technologies and practices developed for the sustainable management of land, vegetation and rangeland resources

3.1 Output Targets

2007:

– Best-bet options for sloping olive orchards available

– Approach for participatory development of land management practices available (participatory technology development)

2008:

– Adoption and ex ante impacts of proven technologies on reversing land degradation completed in Karkheh River Basin, Iran.

– Conservation tillage tested in Morocco.

– Guidelines for assessing the economic and environmental impacts of improved land management options made available to NARS in at least two CWANA countries.

2009:

– Three additional best-bet interventions available.

3.2 Research Approach to Develop International Public Goods

Interventions produced from benchmark site studies will be incorporated into future projects and training courses on better management of the natural resources and analyzed across a range of different ecosystems. Collation of the interventions and results will be formulated into site specific contexts by extrapolation and further analyses using tools such as GIS and modeling.

Output 4: Community-based land management practices.

4.1 Output Targets

2007:

– Community-**based** approaches to rangeland management

2008:

– Outscaling strategies for land management practices developed for project areas;

– Guidelines for watershed management in dry mountains available

2009:

– Community-based land management practices used by partners and refinement of the approaches

4.2 Research Approach to Develop International Public Goods

Emphasis is placed on the co-management of rangelands and watersheds (with MP1) by land users and government departments in Syria, Morocco, Tunisia and Iran using community-based approaches. These will be extrapolated to other sites by NARS and extension services. Thus a common approach to community-based land management practices under marginal dryland conditions will be formulated.

Output 5: Improved policy and institutional options for developing enabling environments to enhance private and public investment in dryland development and to combat desertification.

5.1 Output Targets

2007: Impact of policies and institutional settings on desertification and the welfare of rural people evaluated and alternative institutional and policy options to prevent/reverse desertification identified (with MP5).

2008: Regional workshops/seminars on impact of policies and institutional arrangements on land degradation.

2009: Development of alternative policy options to combat desertification

5.2 Research Approach to Develop International Public Goods

Policy and institutional options are developed through on-the-ground research with the involvement of local organizations in benchmark sites in Syria, Morocco and Tunisia and in the future with Central Asian countries. Research findings will be presented to land users, research and extension agencies and government policy decision makers. The formation of local committees will be catalyzed by ICARDA. These committees will be the main avenue into government polices.

The up scaling via policy options and policy advocacy is expected to have impacts at the national and regional levels and will be done mainly by NARS and government agencies.

Output 6: Training and human capacity building to manage natural resources in areas affected/prone to land degradation.

6.1 Output Targets

2007: Training of national programs in CWANA on INRM approaches, impacts and importance of land degradation, participatory and action research methodologies

2008: Guidelines for up-scaling successful technological, institutional and policy options developed

2009: Training expanded to other partners

6.2 Research Approach to Develop International Public Goods

Training will involve multiple stakeholders in participatory action research as well as formal training of researchers and extension agencies. Training modules and guidelines will be offered to NARS outside the immediate research areas or integrated research sites. Training modules and guidelines will be developed by ICARDA involving alternative approaches to the classical in house and formal training courses for capacity building.

MP4: Diversification and Sustainable Improvement of Crop and Livestock Production Systems in Dry Areas

Outputs

Output 1: Analysis of market constraints and opportunities for value-added crop and livestock products in the dry areas

1.1 Output Targets

2007:

- Marketing niches for value-added crop products identified and shared with NARS
- Best-bet small ruminant health delivery and other technology options for better market access tested in Tunisia, Sudan, Syria and Jordan (with ILRI)

2008:

- Information on market constraints and opportunities for milk derivatives, value added crop products and forages documented and shared with NARS and other stakeholders communities in Syria, Jordan, Tunisia, Brazil, Venezuela and Mexico
- Information on small ruminant diseases and health delivery systems that maximize marketing opportunities documented and shared with NARS and other stakeholders in Tunisia, Sudan, Syria and Jordan (with ILRI)

1.2 Research Approach to Develop International Public Goods

The Output will develop simple and rapid methodologies to simultaneously assess market opportunities and constraints and needed technological reorientation, which could be used in general approaches to improve productivity and income of crop and livestock producers by NARS in other countries and conditions. The developed methods also have the potential to be integrated into efforts that consider international trade. This will be facilitated by consolidating multi-site analysis across different production domains.

Outputs will be relevant across local and international scales. At a local level, the emphasis is to better understand market characteristics and especially consumer preferences and production and health constraints to market access by the poor. At the national and regional levels, the overall objective is to increase market efficiency and access by poor farmers through research into marketing constraints (policies, transaction costs, infrastructure, transportation, taxes), especially threats of market exclusion/disruptions due to the occurrence of and associated sanitary regulations for small ruminant diseases. Information on market and production constraints will help direct future research. Outcomes (understanding, technical options) will be relevant across countries where work is being done and more broadly to other countries with similar production systems and environments.

Output 2: Options to increase the productivity of agricultural systems and to diversify income generating opportunities available to rural households, by diversifying cropping systems and increasing the quality and end-use value of crop products

2.1 Output Targets

2007:

– Statistical methodologies for evaluating productivity trends in long-term cereal-legume rotations developed and transferred to NARS
– Improved agronomic management packages for olive, safflower and selected medicinal plants developed and promoted in Syria, Iran and Central Asia
– Adoption and potential impact of improved packages for high cash crop production under Protected Agriculture assessed in Arabian Peninsula and Afghanistan
– Genetic resources collected, nutritional needs quantified, and pest and post-harvest losses reduced for date palm in the Arabian Peninsula

2008:

– Agronomic and conservation tillage packages for various cropping systems assessed and promoted in West and Central Asia (Iran, Turkey, Syria, Morocco, CAC)
– Evaluation and promotion of barley, lentil and chickpea lines with improved micro-nutrient and market characteristics
– Improved intensive cash crop production packages for protected agriculture with less water promoted in the Arabian Peninsula & Afghanistan
– Good agricultural practices for date palm developed and promoted to maximize production and quality in Gulf countries

2009:

– Improved crop management and better adapted crop varieties identified and promoted in Iraq
– Sustainable and ecologically sound IPM systems for date palm which reduce losses caused by major pests and diseases tested and developed in Gulf countries
– Use of solar energy for intensive cash crop production under protected agriculture evaluated and introduced in the Arabian Peninsula

2.2 Research Approach to Develop International Public Goods

Work will be undertaken in multi-site, community-based, participatory research networks which will generate technologies which are widely applicable across recommendation domains. Major IPGs will be verified technologies, published articles and experienced/trained scientists with potential to be applied widely in other dry rainfed areas to solve problems and provide technologies for farmers confronted with similar constraints.

Output 3: Crop-livestock technologies to increase the productivity of livestock and to diversify and increase the quality and value of their products, through improved feed supply, feeding, health and breeding practices tested with NARS and farmers in CWANA

3.1 Output Targets

2007:

– Forage-livestock technologies that increase productivity of small-scale lamb fattening and peri-urban dairy producers involving least-cost feeding, health and reproductive management in West Asia (Syria)
– Strategies to improve food-feed crops and pasture/forage legumes as feed resources in small-scale crop-livestock farms
– Integrated production technologies for using spineless cactus as supplementary feed for livestock under harsh environmental conditions in the Arabian Peninsula

2008:

– Assessment of alternative feedstuffs and their impact on milk quality completed in West Asia (Syria)

– Models for integrated crop/range-livestock systems and their impacts on crop and livestock outputs and soil identified and pilot-tested in at least two countries in CWANA
– Improved cultivars of food-feed crops and forage legumes for small-scale crop-livestock farmers

2009:

– A model for expanding research outputs from a few test communities to many communities to facilitate out-scaling tested in Syria and Latin America
– Phenotypic and genetic (molecular) characterization of small ruminants (Syrian goats) along the Silk Route from Central to West Asia
– Agroforestry strategies to diversify feed resources and/or feeding systems of small-scale crop-livestock farms for efficient use of land, water, and nutrients in CWANA

3.2 Research Approach to Develop International Public Goods

The research will be linked through the respective NARS partners to country pilot sites where more applied and adaptive studies will be undertaken. Linkages have been established with sister CGIAR research institutions, especially ILRI, CIAT and ICRAF, to tackle research issues of global significance – i.e. issues that cuts across different production systems and agro-ecologies. The output will generate methodologies to orient production to better target markets with innovative production strategies. This, along with the knowledge and technology developed, will enrich the knowledge base of public goods with potential to be applied in other marginal and dry areas to solve problems and provide technologies for farmers confronted with similar constraints. Work will be undertaken in multi-site, community-based, participatory research networks which will generate technologies which are widely applicable across recommendation domains.

Output 4: Options for adding value to crop and livestock products through improved post-harvest handling and processing accessible to NARS and farmers

4.1 Output Targets

2007:

– Production technologies for diversifying milk derivative products in response to market opportunities developed in West Asia (Syria) and Mexico

2009:

– New cost efficient procedures for management and feeding that do not affect the quality and organoleptic properties of processed products (yogurt and cheese) developed for dairy sheep in Syria
– Efficient post-harvest quality and value-adding processing packages for date palm developed and promoted in countries of the Arabian Peninsula

4.2 Research Approach to Develop International Public Goods

The output will generate methodologies geared at offering additional income to farmers, importantly integrating the milk harvesting, processing and marketing work of women. This, along with the knowledge and technology developed, will enrich the knowledge base of public goods with potential to be applied in other marginal and dry areas to solve problems and provide technologies for farmers confronted with similar constraints. Work will be undertaken in multi-site, community-based, participatory research networks which will generate technologies which are widely applicable across recommendation domains.

Output 5: Knowledge and information to enhance the diversification of income generation options and reduce risk through training, networking and access to information accessible to NARS and other stakeholders (producers, handlers, marketers, policy makers).

5.1 Output Targets

2007:

- International network on crop-small ruminant interactions established in Latin America and an international workshop on integrated crop-livestock production organized for WANA
- Three MSc/PhD students trained in aspects of diversification and sustainable improvement of crop and livestock production from Syria, Mexico and Denmark
- Twenty NARS researchers and extension officers from WANA and Asia (Iraq, Yemen, Uzbekistan, Syria, Sudan, Ethiopia, and Afghanistan) trained on integrated crop-livestock production
- Twenty research and extension scientists from Iraq trained in crop improvement and management methodologies and technologies
- Training course on green house installation and crop production under protected agriculture for 20+ farmers in the Arabian Peninsula

2008:

- Twenty NARS researchers and extension officers from WANA and Asia (Iraq, Yemen, Uzbekistan, Syria, Sudan, Ethiopia, and Afghanistan) trained on integrated crop-livestock production
- Twenty research and extension scientists from Iraq trained in crop improvement and management methodologies and technologies
- Two MSc students training/trained in aspects of diversification and sustainable crop and livestock production from Syria and Jordan
- Nine MSc students in WANA trained in livestock health and marketing issues (with ILRI) from Tunisia, Sudan, Syria, Jordan
- Training course on Integrated Production and Protection Management (IPPM) under protected agriculture for 20+ farmers in Arabian Peninsula
- Regional network and discussion forum established for intensive cash crop and cactus production in the Arabian Peninsula

2009:

- Twenty NARS researchers and extension officers from WANA and Asia (Iraq, Yemen, Uzbekistan, Syria, Sudan, Ethiopia, and Afghanistan) trained on integrated crop-livestock production
- Ten researchers from Central Asia (Kazakhstan, Kyrgyzstan, and Tajikistan) trained in aspects of diversification and sustainable improvement of crop and livestock production
- One MSc student trained in aspects of diversification and sustainable crop production from Syria
- Training course on Integrated Production and Protection Management (IPPM) under protected agriculture for 20+ farmers in Arabian Peninsula
- Web-accessible date palm expert system developed for crop management & handling in the Arabian Peninsula

5.2 Research Approach to Develop International Public Goods

Training will play a fundamental role in contributing to the development of international public goods, by introducing among NARS and collaborators, and in the research environment, new strategies to collect, analyze, consolidate and promote information. In particular, multi-sites identification and verification of technologies will expand recommendation domains for out-scaling technologies. New approaches linking technological research with market opportunities will expand and increase attractiveness of options to producers and consumers.

MP 5: Poverty and Livelihood Analysis and Impact Assessment in Dry Areas

Outputs

Output 1: Causes of poverty and determinants of livelihood strategies in the dry areas are quantified, documented and accessible to stakeholders.

1.1 Output Targets

2007:

– GIS data bases and poverty mapping completed for selected areas in Syria

2008:

– Determinants of livelihood strategies within different agroecological and production systems in Syria, Morocco and Pakistan identified, documented and accessible to users.

– Potential livelihood options (pathways out of poverty) in selected sites in Iran, Syria, and Uzbekistan identified (*CP on Water and Food*).

2009:

– Guidelines for evaluating research priorities for targeting research towards poverty reduction developed

1.2 Research Approach to Develop International Public Goods

This research produces knowledge outputs in the forms of tools and methods for poverty mapping, characterization of livelihood strategies, and pathways out-of-poverty that have applicability beyond the borders of countries where they are developed.

Scientific understanding to the nature, causes, intensity, and driving factors of poverty in dry areas under different production systems, agro-ecologies, and livelihood groups will generate important lessons learned for technological, institutional, and policy options interventions for poverty reduction.

Output 2: Impacts of agricultural research on productivity, income, and rural welfare in the dry areas quantified and accessible to stakeholders.

2.1 Output Targets

2007:

– Adoption indicators and factors affecting the adoption of agricultural technologies identified in Egypt, Sudan and Ethiopia

– The potential impact of crop and livestock technological options on poverty and rural livelihoods analyzed in Uzbekistan and Syria

2008:

– Frameworks and methodologies for assessing adoption and impact (ex ante and ex post) developed, documented and made accessible to users

2009:

– Impact of winter chickpea and other crops' technologies on household income and crop productivity documented in Syria, Egypt, Ethiopia, and Sudan

2.2 Research Approach to Develop International Public Goods

Development of methods and indicators, at various scales, of *ex ante* and *ex post* impact assessment that have applicability to multi-countries (more than one country)

to ensure the full relevance of technological, institutional, and policy options to the poor.

International and regional comparative studies on technology adoption and impact in dry areas and related NARS capacity building that involves more than one country.

Ex post assessment of the actual impact pathways and of documented impacts in relation to the planned impacts, provides valuable information for future planning of IPG research outputs and the identification of constraints that could be the subject of further research and/or development investments in dry areas.

Output 3: Impacts of natural resource management (NRM) research on economic, social and environmental sustainability quantified and results made available to stakeholders.

3.1 Output Targets

2007: Benefits and costs of water harvesting options in Jordan and Syria quantified and documented

2008: Frameworks and methodologies for valuating natural resources technologies and assessing their impact adapted or developed and made accessible to users

2009: Social, economic, and environmental impacts of mechanical water harvesting systems documented in Jordan and Syria

3.2 Research Approach to Develop International Public Goods

Tools and methods for assessing the impact of NRM research and valuation of NR benefits and environmental attributes have applicability to more than one country in dry areas.

International and regional comparative impact assessment studies and related social, economic, and environmental indicators for INRM research that involve more than one country for suggesting the relevance of technological, institutional, and policy options.

Feedbacks and lessons learned contribute to technology development for INRM-based production systems that can be used for more than country in dry areas.

Output 4: Framework for community-based and participatory research approaches adapted or developed and made available to stakeholders (in collaboration with other MPs).

4.1 Output Targets

2007: Frameworks for community-based and participatory approaches developed and shared with NARS

2008: Tools for successful implementation of participatory and community-based research approaches developed and made accessible to NARS

2009: Participatory and Community-based approaches institutionalized in Jordan, Tunisia, Morocco, Algeria, and Lebanon

4.2 Research Approach to Develop International Public Goods

This output is targeted to the development of tools, methods, and institutional arrangements for participatory and community-based approaches that have applicability to more than one country in Dry Areas.

Contribution to technology development through active participation and involvement of end-users in project implementation that can be effectively used in more than one country of similar conditions

Output 5: Policy and institutional options analyzed and priorities for public investment to improve rural livelihoods in dry areas identified (*joint research with IFPRI*)

5.1 Output Targets

2007:

– Comparative analysis of investment options in selected project sites in Morocco and Tunisia and calculation of returns to investment completed

2008:

– The returns to investments in the dry areas and their effects on rural livelihoods in three countries evaluated and results made available to decision makers

– Effectiveness of different policy and institutional options in dry areas in selected countries evaluated and documented

2009:

– Alternative policy and institutional options for improved water management identified in Egypt, Jordan, and Morocco

5.2 Research Approach to Develop International Public Goods

The development of tools and methodologies for assessing the returns to investment in dry areas that have applicability to more than one country.

International and regional comparative studies for assessing the effectiveness of existing policies on the uptake of improved technologies and the management of natural resources that involves more than one country.

Lessons learned from the collective management of common natural resources (e.g., communal management of rangelands) for technology, institutions, and policy relevance.

Output 6: Capacity of national research and extension programs in the application of economic tools, livelihood analysis, and impact assessment enhanced.

6.1 Output Targets

2007

– Three graduate research students in research related to poverty and livelihood analysis and impact assessment completed their degrees

2008:

– Frameworks, tools and methodologies for assessing impacts of agricultural and NRM research used by five NARS.

– International workshop/conference on assessing the research impact and rural livelihoods in the dry areas organized

2009:

– Three graduate students in research related to poverty analysis and natural resource economics completed their degree

6.2 Research Approach to Develop International Public Goods

Tools and materials for NARS capacity development that have applicability to more than one country Lessons learned from capacity building of different national programs and implications on enhancing research effectiveness.

MP6: Knowledge Management and Dissemination for Sustainable Development in Dry Areas

The research of KMD is aligned with all five CG System Priorities with the strongest contact point in contributing to the development of sound policies and institutions in Priority 5. There are also within KMD some development activities which lie outside the CG System Research priorities, specifically within Output 3: 'Effective mechanism for mitigating natural disasters and for agricultural rehabilitation in post conflict countries'.

Outputs

Output 1: Enhanced access by end users to key agricultural knowledge elements (TIPOs; methodologies; lessons learned; 'best-bet' practices; innovations) for sustainable agricultural production.

1.1 Output Targets

2007:

– Available and verified key agricultural knowledge elements generated by ICARDA and/or partners analyzed and shared in a participatory co-learning approach. Packages disseminated and ready for up-scaling

– Video and other media messages on improved milk processing practices delivered to NARS and other users; agricultural research information processing system developed

– Community-based adaptive research and technology evaluation approaches adopted by national programs in selected countries

– Two inter-governmental and CBO peer-reviews of first and second order draft reports of the CWANA Sub-Global Assessment for International Agricultural Science & Technology for Development (IAASTD) conducted.

2008:

– Approaches and methodologies for disseminating and up scaling verified key agricultural knowledge elements to wide segments of the rural poor developed

– ICARDA research activities linked with development projects as a means of delivering research results to end users

– Available e-learning resources accessible to NARS through collaboration among IARCs and linkages between the WANA Regional Agricultural Information System (RIAS), coordinated by GFAR

– The IAASTD CWANA Sub-Global Assessment Report completed, published and distributed

2009:

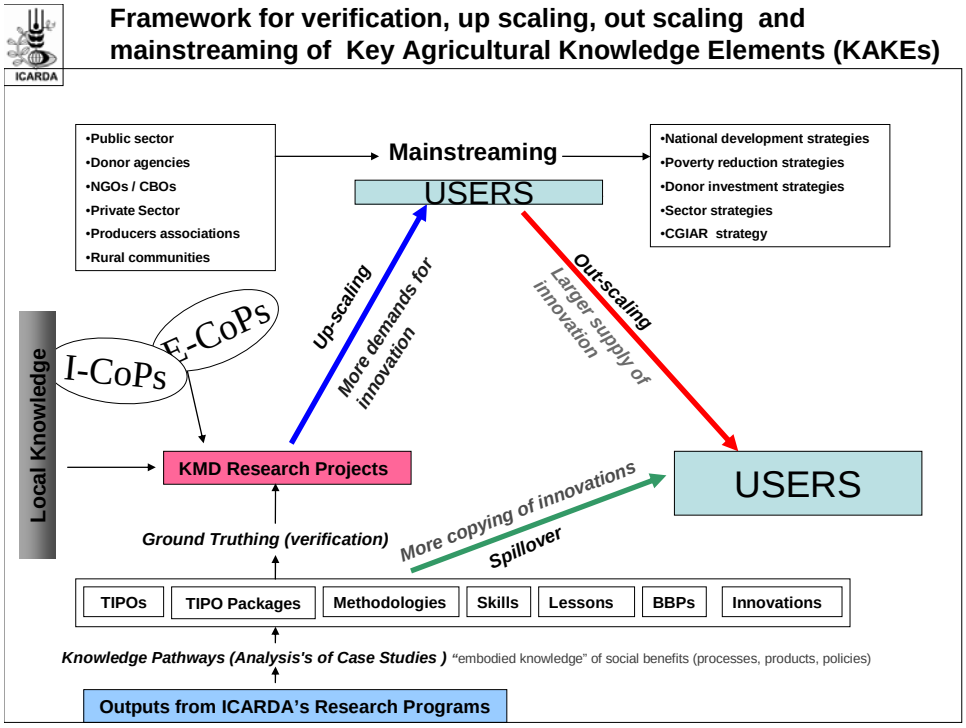
– Demand and supply-based approaches, methodologies and toolkits identified from the analysis of the knowledge pathways of research programs (supply based), or developed from new research programs on KMD (demand based) designed through co-learning and implemented according to the needs.

– TIPO packages such as: models for up-scaling the community based seed enterprises, systems for the production of winter chickpea, IPM for Hessian fly and Sunn pest, and dairy goat TIPOs for the rehabilitation of livelihoods of women in post conflict areas in Afghanistan and Pakistan, identified and disseminated as IPGs

1.2 Research Approach to Develop International Public Goods

The KMD framework is based on understanding that the results generated from international agricultural research are potential NPGs and IPGs. To realize this potential, KMD is undertaking research, rooted in the principles of co-learning and sharing, with the broader stakeholder community to explore methodologies to establish IPGs through investigating successful supply- and demand-driven approaches to disseminating key agricultural knowledge. *Supply-driven* approaches justify the benefits of public investment in agricultural research and development to the concerned donor community in the short-term. *Demand-driven* approaches explore ways in which knowledge can be utilized in the development and dissemination of new technologies. Innovative methodological approaches include the use of community development communication, development journalism, and village drama.

The figure below provides an overview of the KMD research approach to creating NPGs/ IPGs. It considers how the stakeholders (rural communities, public and private sectors, scientists, civil society organizations, *etc.)* can be brought together in coalitions to facilitate mainstreaming of up-scaling, out-scaling, of verified *key agricultural knowledge elements.*



KMD's research approach to developing NPGs and IPGs has three steps:

Step 1: Analysis of Existing Knowledge Pathways to enable the *key agricultural knowledge elements* (TIPOs, TIPO packages, best bet practices, innovations)

emerging from current and past research projects to be identified. To do this KMD has developed a *case study template* to ensure consistent analysis and documentation. The case study template has a modular structure that enables a sequence of knowledge to be built in the form of outputs, best practices, innovations, outcomes, TIPOs and TIPO Packages.

Step 2: Verification (ground truthing): A *ground truthing survey* exercise will be conducted in close collaboration with MP5. The purpose is to verify the *key agricultural knowledge elements* selected with the broader stakeholder community – an essential step in turning them into valid NPGs and IPGs.

Step 3: Dissemination with Partners:

Up scaling is the expansion of a small-scale activity. Up scaling is the process that allows KMD to identify the factors that lead to successful or failed dissemination of promising key agricultural knowledge elements. Learning how particular key agricultural knowledge elements are tested, adopted and disseminated will enable KMD to develop suggestions on how to (a) out-scale them and, (b) promote favorable environments that permit mainstreaming.

Out scaling is providing a larger supply of innovations (NPGs, IPGs) nationally, regionally and internationally. To do this, KMD will build on the lessons derived from following and assessing up-scaling processes. This work depends on achieving broad stakeholder support for key agricultural knowledge elements selected.

Mainstreaming: is developing favourable environments (supportive of low risk, cost effective approaches) that allow equitable use of key agricultural knowledge elements by the widest segment of the poor rural communities (example: integration of key agricultural knowledge elements in development and investment projects at national, regional and international levels)

Output 2: Strengthened seed systems through increased private sector participation and alternative delivery systems

2.1 Output Targets

2007:

- Three village-based seed enterprise (VBSEs), in each of Algeria, Morocco and Tunisia providing at least a total of 100 MT of quality seed to farmers.
- Chickpea seed quality (health) management options analyzed and published
- International seed trade conference for CWANA organized

2008:

- Document on regional harmonization of seed policies and regulations finalized, agreed upon and submitted to legislative bodies for implementation in one sub-region (candidate region: CAC).
- WANA Seed Network operates as information network, biennial international seed conference and a regional seed association

2009:

- Village-based seed enterprises in selected CWANA countries established)
- Seed bank dynamics in degraded rangelands documented and disseminated
- Wheat seed supply systems in Iran documented and disseminated

2.2 Research Approach to Develop International Public Goods

National seed industries in the CWANA region face several policies, regulatory, technical, institutional and organizational constraints which hamper their performance. The process for implementing policy, regulatory and institutional reforms and harmonization involves collecting, reviewing, and assembling the frameworks, and analyzing constraints that hinder their performance and regional integration to develop common protocols, procedures and standards for free movement of varieties and seeds across borders. The development and application of research methodologies for seed policy, regulatory and institutional analysis would enhance our understanding of the major constraints, the process of institutional evolution within a given policy and regulatory framework that leads to desired impacts. While the model policies and regulatory frameworks can be adapted to similar set of countries and regions, the exercise would result to developing technical, institutional, regulatory and policy options (TIPOs) for seed sector development in the region or elsewhere..

Promoting rural enterprises needs a proper understanding of existing local institutional arrangements, farming systems and markets. The alternative approach for seed delivery targeting farmers in less favorable environments and remote areas encourages establishing VBSEs with selected communities through farmer participation. The concept follows a bottom-up approach which appears to be more appropriate as it potentially builds upon existing local knowledge, skills and experience within the farming communities to serve local markets. The process of mobilizing and strengthening the capacity of farmers in becoming viable and sustainable rural institutions that produce and market high quality seed within their community and beyond can be easily documented. Such a process is in itself an IPG that could be replicated by up-scaling and out-scaling in other locations or countries with similar socioeconomic, regulatory and policy environments and where a gap exists in seed demand and supply.

Research on chickpea seed quality (health), seed bank dynamics in degraded rangelands and alternative seed delivery systems have been added to the output targets to develop IPGs for seed quality management and rangeland rehabilitation options.

Output 3: Effective mechanism for mitigating natural disasters and for agricultural rehabilitation in post conflict countries

3.1 Output Targets

2007:

- Collaborative agricultural rehabilitation program developed in Sudan
- GIS database and maps of suitable crop varieties by agro-ecologies developed and disseminated.
- Communication strategy for RALF (Research into Alternative Livelihoods Fund) in Afghanistan developed

2008:

- Potential alternative livelihoods for poppy producers in Afghanistan identified in projects supported by RALF and managed by ICARDA

2009:

- Agricultural livelihoods for women in post-conflict areas in Afghanistan and Pakistan rehabilitated

3.2 Research Approach to Develop International Public Goods

To enable regions and countries to recover from disaster, it is necessary to move quickly by providing proven technologies from similar agroecologies elsewhere. For example, in Afghanistan, we used our experience in Baluchistan, Pakistan, and from southern Uzbekistan to provide 'best bet' options for adaptive research. Now having conducted adaptive research with farmers in Afghanistan, we have produced additional information, which is being used in new projects in Baluchistan, Pakistan, Uzbekistan etc. The experience and knowledge ICARDA has gained in natural disaster and post-conflict situations is valuable, and if well managed can be formulated in IPGs that can be used globally for similarly harsh conditions. KMD's aim is to better coordinate ICARDA's on-going activities in Afghanistan and strategies elsewhere in the region (e.g. Iraq, Palestine and Sudan) where there is (or will be) an urgent need to disseminate relevant TIPOs. Therefore, KMD is documenting, analyzing, synthesizing and testing TIPOs in various locations. This will enable selected TIPOs to be grouped and sub-grouped into specific IPGs that ameliorate harsh conditions.

ICARDA is managing RALF, which aims to develop and promote innovative alternative livelihood options for rural Afghans currently economically dependent on opium poppy. RALF supports 11 research projects that are investigating potential sustainable alternatives to opium poppy cultivation. Projects are investigating the production and marketing of medicinal crops, new oil seed crops, high-value vegetable crops, forage and dairy projects, and rural micro-finance. Training and capacity building of R&D staff and farming communities is continuing. KMD will play a key role in the dissemination of research results to the stakeholders. The IPGs created will be tried and tested by several means of communication, ranging from videos, TV and radio broadcasts, farmer field days, workshops, website development and internet discussion forums, stakeholder meetings, posters, brochure etc. Communications will be gender-sensitive in terms of message and form, and will aim to reach women as well as men. A key aspect of these IPGs will be the fact that they will demonstrate how to be effective in a situation that prevents full disclosure of the message. They will also point ways of how to work in difficult, complex post-conflict situations.

Output 4: Enhanced management and delivery to stakeholders of research products and knowledge

4.1 Output Targets

2007:

– Expert system for plant protection in chickpea and barley disseminated to users.

2008:

– Expert system for management of date palm developed and tested

2009:

– Smooth flow of ICARDA generated knowledge assured.

– Agricultural research information processing system developed

4.2 Research Approach to Develop International Public Goods

Developing agricultural expert systems and analyzing other impact pathways of ICARDA-generated knowledge, especially TIPO packages and methods and innovations will help in the drafting of ICARDA IPGs. These will be tested, and

adapted, to a variety of agroclimatic and socioeconomic environments in order to be polished and finalized. Linking and harmonizing ICT and KMD will contribute to effective dissemination and communication of IPGs to the global audience and users. The outputs will help ICARDA technical programs and their collaborating NARES and ARIs to better orient and target their research for development work; NGOs and development agencies/activities/projects for speeding the decision-making process and enhancing implementation of activities (saving time and resources); and help farming communities to better use their resources.

Output 5: Enhanced capacity of national research, seed system and technology transfer programs to better manage and disseminate knowledge

5.1 Output Targets

Annually:

- One regional workshop and three courses organized in seed industry development aspects training over 100 NARS and seed staff and farmers
- Annual training course in use of agricultural expert systems
- E-learning and web-based training resources developed in collaboration with IARCs and advanced research and training institutions each year.

5.2 Research Approach to Develop International Public Goods

The expert systems are in themselves a base for developing IPGs as these systems provide documentation of knowledge as related to the subject of the system in question. However, with further testing and adaptation, analysis and synthesis of the documented information, a variety of IPGs can be derived from each expert system already available. Conducting the training programs and developing e-learning and web-based training resources, and training manuals, will upgrade NARS capacity for testing and adapting the IPGs derived from the expert systems and other knowledge sources.