

Final Report of the CWANA Panel

The CWANA panel started slowly but was blessed with a number of distinguished, experienced persons who stayed with the dialogue and made important interventions. We had the participation of a goodly number of panel members, but the number of contributions at the end was more limited than I had hoped. Still, major problems and concerns of the region were identified that have major implications for the CGIAR and its partners. As Moderator, I have enjoyed the interchange of ideas and am impressed with the depth of commitment of the panel members to the region, its agriculture and its people.

As instructed by the dialogue leadership, our dialogue centered on a number of suggestions concerning "emerging/critical/unattended issues to meet CGIAR goals, ongoing and new problems/challenges/threats based on:

- Changes in poverty: nature, causes, and dynamics.
- New constraints on productivity: agriculture, forestry, and fisheries.
- New threats to sustainability of agro-ecosystems and their NR content."

1. Changes in poverty.

In CWANA, more than 80% of the population lives in countries with an average Gross Domestic Product (GDP) of \$1.10 per day. Further, as the region with the second-highest population growth in the world, poverty is likely to continue unless something drastic is done to change those trends. Much of the poverty in CWANA exists in rural areas where the poor suffer for lack of access to land, water, and other factors of production. And, despite the fact that CWANA contains places that were the cradle of agriculture, today this region lags well behind other regions in agricultural development and performance. Still, for many CWANA countries, agriculture - however it performs - remains the primary industry and - if transformed - could provide employment, improved incomes and sustenance for many poor people. To make this possible, new technologies suited for the drylands in the valleys, steppes and mountains need to be developed and/or adopted.

The Panel agreed in principle that agriculture will continue to be the main industry for many CWANA countries, and that sustainable increases in productivity will benefit the poor: further, that to help reduce poverty, agricultural transformation is needed.

2. New Constraints on Productivity: Agriculture, Forestry and Fisheries.

In general, agricultural research and development continue to receive low priority in the Region, notwithstanding official documents that indicate otherwise. This apparent lack of commitment is at best surprising, considering the daunting problems of the region that cry for solution.

The panel agreed that water is the over-riding issue and problem, based on the following:

- There are 15 CWANA countries with internal renewable fresh water availability below the "water poverty line" of 1,000 cubic meters/capita/yr.

- Competition is almost certain to occur between water for agriculture (especially for irrigation) and domestic water use by humans and industries.
- Most agriculture in CWANA depends on low, highly variable rainfall and therefore farmers in dry areas must make best use of incident rainfall.
- Considering the severe shortages of water in CWANA, there is a critical need to use water from all sources -- including waste water and water of low quality - as efficiently as possible. To do this, water use efficiency must be improved in both rainfed and irrigated agriculture, and in particular, the productivity per unit of water must be improved. Investments in research to improve the productivity of water in both irrigated and dryland farming are essential for this most water-scarce area, and should be of high priority.
- Agricultural intensification and diversification appear imperative in CWANA, to 1) improve crop yields, 2) by obtaining higher yields, make it possible to free more lands for other crops and/or enterprises, 3) make best use of improved water use efficiency in both irrigated and rainfed agriculture, and 4) improve incomes of an already-poor rural population.

3. New Threats to Sustainability of Agroecosystems and their Natural Resources Context.

- a. CWANA has limited amounts of arable lands, estimated at 4% of the total land area, amounting to about 0.22 ha per capita. Much of that - some 45% of the total area of irrigated and rainfed arable lands - is subject to land degradation, including erosion and salinity. A matter that cannot be separated from the land issue is degradation of rangelands and steppes due to overgrazing and soil erosion; such lands are important in producing livestock products, in preserving the native flora and fauna and - importantly - as watersheds. The challenge for CWANA's agriculture is to conserve land, water, and soil resources of both arable and marginal lands - including rangelands and deserts - under conditions of continuing food deficits as well as a growing food gap that has resulted in the world's highest level of imports of food grains.
- b. Crop improvement efforts have been important in producing robust, drought-resistant plants with necessary resistance/tolerance to pests, diseases and abiotic stresses, and in providing technology to farmers managing marginal lands, including arid and semi-arid lands. There was general agreement in the Panel that crop improvement to produce robust, productive crop and forage plants for arid lands remains the best strategy for research in CWANA, which, when coupled with improved water use efficiency, will make greatest and most sustainable gains.
- c. CWANA includes three major centers of plant diversity where a number of temperate crops originated and where their wild relatives and landraces are endemic or indigenous. However, precious biodiversity is being threatened by habitat degradation, agricultural expansion and intensification, and overgrazing. There was general agreement that efforts to conserve, describe and utilize genetic resources - both plant and animal - in CWANA should remain a high priority for research and research-related activities.

New developments to be considered in coming to decisions concerning research priorities and strategies for the CGIAR.

The topics chosen were those identified by the dialogue organizers.

1. In New Developments in Science

Agriculture is the single most important sector in the economies of low-income countries. Low agricultural productivity in low-income developing countries is a major cause of poverty, food insecurity and poor nutrition. Agriculture depends on natural resources; however, unsound agricultural practices can degrade and diminish natural resources such as land, water and biodiversity.

One of the most striking features of CWANA agriculture is its immense diversity, which is a response to the extreme differences in agro-ecology, access to markets and capital, and farm size. Such diversity allows few opportunities to wholesale new agricultural technologies in CWANA countries, suggesting that, to underpin modernization and to generate a flow of innovations suited to different situations, a disproportionate research effort in relation to the size of the agricultural sector will be needed. Investments in agricultural research have been limited due to lack of critical mass and adequate financial input.

Agriculture in CWANA is at the heart of rural development, providing opportunities and jobs for rural people. There is a significant role for both NARS and CGIAR and concerned research systems to develop the rural sector, by emphasizing integrated agriculture production at farm level, taking in consideration both livestock and crop production. There is a need to keep agriculture on the agenda of the decision-makers of CWANA, and of the donors. To do this, not only past successes need to be emphasized, but also hard data are essential on return on research investments that have been made.

Developments in science can improve agricultural productivity and fight poverty if they are used effectively and efficiently. Progress in scientific research in the last few years shows that, although food sufficiency remains the number-one problem facing mankind, the battle against mass hunger is not completely lost.

ICARDA has identified a number of areas of "new science" which are needed in CWANA, "... to develop more and better food and fiber products with improved nutritional quality, to reduce food and commodity yield losses due to pests and diseases and drought, to ensure healthy livestock, a sustainable agriculture, and to manage water more efficiently, to prevent and reverse land degradation and to conserve and manage genetic diversity." Further, "... What are needed not only include purely technical matters, but also to develop new approaches to previously intractable, multi-dimensional problems, which include greater holism, broader stakeholder involvement and alliances, institutional as well as policy aspects, participatory community approaches and livelihood analysis to identify the determinants of poverty."

Strategic Research

There is need for the CGIAR to move more into problems requiring strategic research that can be costly, and that usually are below critical mass levels in individual NARS. Strategic research is needed on "quantum jump" technologies, such as low-cost desalinization techniques, that could improve water availability and reduce its cost.

Water

Water has become the main issue. Not only its scarcity, but also its utilization and management in all the countries has to be evaluated/reviewed critically. Intermittent droughts in various countries demand development of mitigating technologies and commensurate strategies.

Investments in research to improve the productivity of water in both irrigated and rainfed farming are essential for CWANA, the most water-scarce region of the world, and should be of high (highest) priority. We have to think about water on two fronts - research on water supply management as well as water demand management - not only on-farm but also on a broader political, legal and institutional level.

Perhaps the question is not how the CGIAR can help in decisions regarding allocations of water between agriculture and domestic use, but rather how it can help in decisions regarding allocations of water within agriculture. There are also important questions regarding water quantity, but also water quality. Many sources of water are contaminated, making them questionable sources for agricultural use.

A number of technologies exist that can make better use of rainfall: supplemental irrigation, tolerant crop types, water efficient cultivation techniques, rainfall harvesting, water collection systems in wadis, etc. We seem to have technical knowledge for all of these, but know much less about political, legal, institutional and financial constraints to their adoption and use by farmers.

Research to reduce costs through improved input use efficiency and less reliance on costly external inputs remains crucial. Here water is the over-riding issue and problem, but research priorities should be re-oriented towards the revitalization of indigenous knowledge and socio-organizational arrangements/institutions regarding water resources management, as well as biodiversity conservation and use, land tenure, and share-cropping arrangements.

Should there be a new institution for "Agriculture and Water" in the CWANA region? ICARDA and IWMI have some bits of water research, so do those working on brackish water as well as others. Finding ways to use wastewater and brackish water appears to be potentially valuable in finding new sources of water for agriculture.

Crop and Livestock Improvement

Continued work is needed on crop and livestock improvement, part of which will be continued and strengthened support to genetic resource conservation. Livestock issues are somewhat behind their plant counterparts in this area.

Genomic technologies will almost certainly permit the improvement of water use efficiency through breeding. This is only part of the solution, but it may be a part for which the CGIAR has a comparative advantage. Also, it is important to understand that water use efficiency has a genetic component that should be addressed as part of the breeding efforts. Crop improvement to produce robust, productive crop plants for arid lands remains the best strategy for research in CWANA, which, when coupled with improved water use efficiency, will make greatest and most sustainable gains.

The ICARDA crop improvement program has demonstrated that new cereal and legume cultivars have helped increase production in countries like Syria. Breeding efforts should continue, and the participatory breeding approach could enhance adoption of new cultivars.

CWANA has not benefited from modern biotechnology for the major good crops and lags behind other regions in this respect. CGIAR should work closer with NARS and the universities in the region, especially in small countries that cannot support feasible biotechnology programs.

Bioscience is an opportunity, particularly in developing water-saving crops. A threat is that bio-engineered crops may face "out of hand" rejections. Should ICARDA play a role there?

Plant (and Animal) Genetic Resources

The question was raised; how can local genetic plant resources be conserved and used, while at the same time producing improved plant varieties?

For proper utilization of genetic resources, human resources capacity building as well as regulatory and policy issues need to be addressed, since CWANA has not paid much attention to this so far. CWANA farmers, policy makers and scientists should realize that genetic resources are important factors in the economy, in achieving food security and in improving community livelihoods.

Managing Natural Resources

In a region where very little land is cultivable, soil issues need to be examined critically, especially with regard to 1) fertility, 2) salinity, and 3) continuous cultivation. Afforestation in the few water-catchment areas is important. The CGIAR and NARSs need to address the delicate balance between intensification and the fragile agro-ecosystems in the region. This is a point where intensification and diversification interact. Intensification here means that one breeds drought- and salinity-resistant crops, early-maturing crop varieties and includes the practice of mixed cropping. Also, CGIAR and NARSs need to look critically at mixed crop and livestock farming as a source of income, a way to manage soils, and also use crop byproducts to feed livestock.

Farmers should be encouraged to diversify their crops and to benefit from new, worldwide trends which emphasize organic agriculture, integrated pest management and good agricultural practices.

Constraints on fisheries are acute: resource depletion and pollution threats are growing, rather than declining. Constraints on forestry appear to be more and more about ownership and title.

Concerning range management; are there new uses for pelts, hides, and wool, for example, to reduce herd size?

2. In New Markets, New Products, New Institutions

Although marketing is viewed by many planners and stakeholders as an adjunct to production, it is assumed to adapt itself to the kinds and quantities of commodities produced. Marketing is a crucial technology in normal agricultural development. However, an efficient and viable marketing system cannot be realized without institutions which provide financing, assume risk, and mediate, impartially, contract disputes; set weights and measures as well as grades and standards; and help to disseminate

market facts. Effective marketing relies on adequate infrastructure in all levels of the marketing system to handle food products - harvesting equipment, training and education, storage plants, pilot packaging plants, etc.- as well as the setting of safety procedures and quality standards. Such handling procedures are not fully recognized in less developed countries.

Constraints in relation to new markets or products include: aridity, and above all, scarcity of water; small size holdings; rarity of market-oriented farming systems; low yields; inadequate and traditional handling of crop products; and inadequate infrastructure (transport and road nets, storage facilities, processing and commercial handling facilities, and trained personnel). Most export markets in CWANA are small, and there is need to review national and regional policies and agreements as well as future policy trends and new international agreements and regulations.

To improve marketing, market-oriented production is needed, plus export promotion strategies, more investment in research and development, and promotion of organic production. Training programs are needed to deal with up-to-date regulatory and product safety standards, regional groupings to increase inter-regional trade, improve the legal environment to meet the needs of agricultural marketing, and development of an effective private sector.

The poor often find markets difficult to reach or penetrate. The international marketing problem is how - with existing Western agricultural subsidies - can decisions be made concerning any element of production (land, water, crops, livestock) be made according to any definition of highest value to its producer or to the system as a whole?

The main source of production growth is production and product differentiation. Under production differentiation we can include new crops (medicinal, aromatic, spices) and under product differentiation, quality improvements through promotion of alternative production systems (organic agriculture coupled with labeling, for example), product processing and marketing and better on-farm storage.

Efforts should be made to stimulate an active private sector in CWANA, both in terms of production and in research and development. Some of the efforts should be given to develop a policy framework and greater inter-country trade.

3. In Changes in the Political Economy

This is a momentous time in the Middle East and CWANA. The threat would be monumental if new developments are seen as needing to be rejected because of their source, or a perception that such developments are antithetical to religion, or challenging to the established order.

It has become increasingly obvious that political stability can serve as a motivator to agricultural productivity, and can stimulate local and regional progress and development. A major factor limiting agricultural productivity is the lack of understanding of socio-cultural attitudes, norms and values in a given political and economic environment.

4. In New Partnerships

The 1990s saw a proliferation of research and academic institutions in CWANA, including some NGOs that conduct research. Some 2,000 academic departments in the region are involved in research in

natural sciences. However, there is a lack of research vision and strategies, weak research performance, financial instabilities, and the absence of an autonomous and liberal research environment. Research results need to be linked to research users (communities and/or policy-makers), within an overall framework of a vision/strategy of a financially stable - and free - research environment.

Because the CGIAR is responsible for only four (4) percent of global resources invested in research and research-related activities in agriculture, fisheries and forests in developing countries, it is clear the CGIAR must increase its partnerships with other R&D institutions, both within CWANA and elsewhere. ICARDA has developed close links with NARS in CWANA, involving dynamic relationships based on open partnerships designed to solve key problems. CGIAR activities should aim to form partnerships involving weak and strong institutions in CWANA, and also to help in linking NARS and ARIs in working on problems facing farmers. CGIAR needs to engage scientists with land-users to help diagnose constraints, farming practices, develop decision-support tools and methodologies in natural resources management and agricultural diversification. Another linkage could be linking scientists with policy makers to help elucidate major constraints and threats to production and/or livelihoods.

Those who would form effective partnerships toward improving rural productivity and incomes in CWANA are saddled with a legacy of agreements no honored. After more than 25 years of "cooperation", it seems fair to conclude that the Centers operating in the region have not always dealt well with overlapping research mandates. In such an environment, it seems unlikely that the Challenge programs will take root and flourish. The Challenge programs, as originally envisioned, would have allocated CGIAR resources to organizations and individuals best able to perform the requested research. Instead, numerous organizations are joining each Challenge program; the problem of overlapping mandates is being aggravated instead of resolved; and additional CG-System resources are being expended on governance. The System seems in danger of becoming collaboratively dysfunctional. It may be wise, particularly in CWANA, to consider alternatives that would provide effective loci of leadership for definable research needs. Needed is a Challenge program that elicits excellence and relevance from partners who have well-defined responsibilities.

In most Low Rainfall Areas (LRAs) in CWANA, local people and relevant stakeholders should be involved in improving management systems, recognizing the importance of participatory management, the incorporation of traditional systems, and the socio-economic benefits of such initiatives. The role and participation of main stakeholders, particularly the private sector, would be facilitated if the activities concerned make business sense for farmers. For more involvement of all stakeholders in a country, various political, policy and institutional measures have been taken, with the aim to decentralize decision-making in natural resource management. Most national Plans of Action for combating desertification and protecting the environment are strongly supported by decentralization policies and legal measures.

Collective interest associations (AIC) currently in charge of water distribution, control, and management now act as intermediaries between their community and public or private partners. Recent legislation has been passed to allow AICs to form agricultural development groups, with the aim to have an AIC act as a single body for the community to take a holistic approach to community development and to negotiate community matters with any party – the administration, NGOs, or any stakeholder or party interested to help in community development.

A key research focus for the future will be to identify and promote “enabling environments” based on appropriate price incentive mechanisms, property and access rights arrangements, pro-poor financial services, and methodologies and processes for ensuring tighter research-extension-education linkages towards the true participation of all stakeholders in the generation of adapted technologies and approaches.

We need to approach poverty through “an empowerment through knowledge” perspective whereby people, especially disenfranchised/vulnerable people, are placed squarely in the center of all research and development efforts that seek to enhance equity, efficiency, quality and sustainability. By working closely with the community, we can learn what their needs are and design our R&D efforts accordingly. We can test, develop, and refine this technology together with the community, and can evaluate and monitor together. The CGIAR and partners could benefit from using participatory approaches in developing new technologies – including participatory plant breeding and in finding practical ways for improving on-farm water use efficiency, etc. Transfer of new technologies to the end users, farmers, is the weakest link in many of the countries, and innovative methodologies to improve this are needed.

Many institutions have launched partnerships to address critical concerns; however, stronger partnerships are needed that enhance the effectiveness of collaboration. New initiatives by donors can strengthen partnerships; thus partnerships represent a challenge to the donors.

The role of women in agriculture should be examined critically. Rural women in some places are the prime movers of agriculture, but have no access to financial institutions and may not own the land on which they work. Their access to land, water and finance could play a major role in the transformation of agriculture and could lead not only to poverty reduction but also to improvement of the nutritional status of rural people.

5. In New Initiatives by Donors

Challenge programs are a response to donor insistence that problems should be addressed, rather than ongoing research should continue to be supported. CGIAR centers will have to conceptualize a program and raise funds for its support.

Donors and NGOs want CGIAR resources to improve the lot of subsistence farmers, which may well alleviate their poverty, but that approach is unlikely in the short and medium term to contribute to substantial positive change in national agricultural productivity.

The status of women in CWANA lags severely behind men. Along with freedom and knowledge, the empowerment of women in one of the three essentials to achieve effective sustainable development in the region.

The priorities and strategies identified by the CWANA Panel

The panel followed an interactive procedure, suggested by the Dialogue leadership. A list of priorities identified by panel members, with accompanying rationale for their justification, was assembled by the Moderator. That list was then sent to the panel, with the request that each panel member identify 5 priority topics, and that they allocate -from a total of 20 points - those points across the topics chosen.

The Moderator then tallied those responses, and reported back to the Panel. Because some responses came in after the closing date, the Moderator decided to add those responses to the totals.

At this time, Alain de Janvry, who is in charge of organizing the dialogue, suggested that because our panel had started slowly that perhaps another round of rankings by the panel might yield a better assessment of the individual panel member's views. That second response was sent out, but only two responses were received, too few to justify making any change in the rankings sent out on May 13.

The following is the final result of the rankings of seven panel members who responded with their rankings for their highest five priorities. Some of the most pertinent comments linked to the dialogue process are presented under each category.

One comment received from a panel member expressed some of the concerns of other members of the panel concerning the topics identified by panel members as being important. It read as follows: "It is obvious that such areas cannot be looked at in isolation. In other words, looking at soil salinity without understanding rural folk in CWANA and/or gender relations will not yield the types of changes that we seek and wish for this precious regions." To that the Moderator can only add his agreement.

The panel rankings are presented below:

1.Utilization of Genetic Resources; genomic techniques and plant breeding to improve water use efficiency in crops.

26 points. (4/7)

Rationale: CWANA, well recognized globally as a source of plant and animal diversity, has nonetheless under-utilized its genetic resources, despite the region's water supply problems as well as a need to incorporate genes for water use efficiency and resistance abiotic and biotic stresses. Crop improvement to produce robust, productive crop plants for arid lands remains the best research strategy for CWANA, which, when coupled with improved water use efficiency, will make the greatest and most sustainable gains for poor farmers. It is important to understand that water use efficiency has a genetic component that should be addressed as part of the breeding efforts. Development of drought resistant varieties and crops needs to be emphasized.

One comment received: I believe it is very important to include the utilization of animal genetic resources, which need to take their place within agricultural genetic resources of CWANA.

2. Research to Improve the Productivity of Water in Both Irrigated and Dryland Farming

20 points. (4/7)

Rationale: CWANA is the most water-scarce region of the world, and is facing a tremendous problem of meeting sufficient water supplies in the near future, for both agriculture and domestic and urban use. Every drop of water must be used as efficiently as possible, to ensure essential food production in a region that currently imports a great deal of food grains to feed its people. Research to improve the productivity of water in both irrigated and dryland farming is essential, and should be of high priority.

3. Water Harvesting, Its Quality and Efficient Utilization

17 points (4/7)

Rationale: Dwindling sources of water are a major concern in CWANA, and agricultural activities in many of the countries depend on irrigation. There is increasing competition for water, arising from increased demand by burgeoning urban populations as well as by rural farmers producing food, fiber and fuel. Water harvesting and utilization should be made more efficient than it is at the moment. Gross interference with water catchment areas affect the quantity and quality of water available. For example, in the Sudan and Egypt, activities in the East African highlands affect both availability and quality of water to those countries, both of which depend heavily on irrigation.

A number of technologies exist that can make better use of rainfall: supplemental irrigation, tolerant crop types, water efficient cultivation techniques, rainfall harvesting, water collection systems in wadis, etc. We seem to have technical knowledge for all of these, but know much less about political, legal, institutional and financial matters. Indigenous knowledge on water harvesting and on techniques to save water should receive study.

4. Intensive Integration of Crops and Animals; Mixed Farming

14 points (4/7)

Rationale: Risk for poor farmers can be minimized by diversifying their sources of income. One way to do this is to encourage mixed farming, where farmers produce both crop and livestock products. There are areas in CWANA where one sees large fields of wheat or barley but few livestock, but often nearby one sees large flocks of sheep kept by desert nomads, who depend on wheat or barley straw which they purchase from crop farmers. Where possible, it makes sense for farmers to raise crops and livestock. Benefits could include improved nutrition for rural populations, utilization of crop residues, and production of manure to help improve soil fertility and structure, including water-holding capacity.

5. Participatory Research by Farmers

8.5 points (2/7)

Rationale: Ownership by farmers of new science technologies should help ensure 1) sustainability, 2) acceptability, particularly when dealing with genetically modified crops and other organisms, 3) that technological innovations are area-specific in view of great differences in the agro-ecologies of the region.

6. Research Into Soil Salinity

7 points (3/7)

Rationale: With over-dependence on irrigation, out of necessity, and the use of inorganic fertilizers, there is not only need to do more research on how to manage fragile soils in CWANA, but also their ability to sustain increased crop yields.

7. Gender

7 points (2/7)

Rationale: The role of women in agriculture needs study, not only because of their dominance in agriculture but also their paramount role in family nutrition. Gender in agriculture is very important in CWANA, particularly because of the perceived decades of behind-the-scenes roles which women in the region have been and are taking. Also, targeting of certain groups of farmers may be needed, because until recently, agriculture has never been thought of as an important source of employment. Projects are needed that suit all components of the rural population, particularly women.

8. Agricultural Intensification

6.5 points (3/7)

Rationale: In a water-scarce region, increasing yields on the best lands by intensifying agriculture may be the best strategy to get the most production from each liter of water, while reducing pressures to produce on the more marginal lands, which then could be devoted or released to more extensive-type activities such as rainfed cereal or grain legume cropping and agro-pastoral production systems.

9. Understanding Rural Folk in CWANA

5 points (1/7)

Rationale: There are powerful social forces in CWANA, including financial constraints, that need better understanding, especially regarding how decisions are made and by whom. There have been few comprehensive/analytical studies that show what these forces are, in spite of the fact that there have been lots of data collection and baseline studies which have focused more on the production side than on the social aspects. The rural world in CWANA needs better study.

10. Extension of Research Results to Farmers

5 points (2/7)

Rationale: The limited resources spent on research will be better spent if we have better technology and extension methodology. We have not benefited as much as other regions from the participatory methodology and farmers' field schools. More effective technology transfer must be found.

11. Strategic Research on "Quantum Jump" Technologies in Water Technology and Management

4.5 points (1/7)

12. Crop Diversification

4 points (2/7)

Rationale: Where environments are suitable for growing crops for export, it may be that such production may be more profitable than growing traditional crops. Also, crop diversification should have effects on both improved and more stable incomes for farmers. Farmers should be encouraged to diversify their crops and to benefit from new worldwide trends which emphasize organic agriculture, integrated pest management (IPM) and good agricultural practices.

13. Seed Production

4 points. (1/7)

Rationale: CWANA, despite having different types of climates that might be suited to specialized seed production, has not benefited significantly from seed production for feed crops, vegetables and/or ornamentals.

14. New Trends in Crop Production and Crops of Quality.

3 points. (1/7)

Rationale: High value specialty crops that might meet new markets could be important in CWANA as a way to use scarce water and to help improve rural incomes. There is some interest in organically-grown products.

15. Range Management

1 point (1/7)

Rationale: Rangelands in CWANA cannot really be separated from agriculture that depends on arable croplands, for the two are often inextricably linked. Indeed, overgrazing and mismanagement of rangelands can have devastating effects on nearby agricultural areas depending on pastoral watersheds to supply needed water for irrigation and domestic use. Also, rangeland users often trade with crop farmers for straw, hay, or periodic grazing of stubble fields and field verges.