

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

INTERIM SCIENCE COUNCIL

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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9 September 2002

Dear Ian,

On behalf of the interim Science Council (iSC), I am pleased to transmit the attached report on the assessment of the full proposals of the Challenge Programmes (CP) under the **Pilot Process**.

The three candidate CPs, namely 1) Unlocking Genetic Diversity in Crops for the Resource Poor, 2) Water and Food, and 3) Biofortified Crops for Improved Human Nutrition received full marks from the iSC and its external peer reviewers.

These Challenge Programmes bring out the best from our Centres and their NARs and ARIs partners. They contribute directly to the CGIAR goals of alleviating poverty, attaining food security and sustaining the productivity of natural resources. They link the CGIAR to a wider array of partners and accentuate the System capacity to play a significant role in the resolution of global challenges. Last but not the least, they promote effectiveness, efficiency and cohesion among our Centres.

Needless to say these pilot CPs have major implications on the balance of our substantive activities across the logframe outputs. They impinge as well on the balance among centre core programmes, system wide programmes and the Challenge Programme portfolio. There is concern that the novelty of the CPs would draw resources away from the heartland agenda in the Centre core programmes and jeopardize further the diminishing ability of SWPs to attract and retain donor support.

However we are confident that the Group's anticipated enthusiastic response to these pilot CPs will be manifested in terms of significant new funding for the System.

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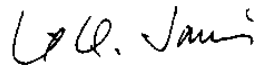
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On behalf of my colleagues and my own, I express appreciation and admiration for the work put into the CPs by the proponents, partners, and the diversity of stakeholders. Indeed the CGIAR is beginning to open up much more widely than was thought possible previously.

I would like to thank the 21 external peer reviewers and iSC Members who have contributed their expertise in helping guide the System in arriving at these judgements. My appreciation goes as well to the behind-the-scenes nevertheless very professional and voluminous output of the overworked iSC secretariat. Whereas we cannot compensate them enough, their efforts go far to add value to our work.

Lastly, I am grateful to you and the Group for the opportunity to engage in this historic exercise of contributing in the evaluation of the pilot Challenge Programmes. Indeed the lessons learnt will be valuable to ExCo and the CGIAR as they move forward with the Regular Process.

Yours sincerely,

A handwritten signature in black ink, appearing to read "Emil Q. Javier". The signature is written in a cursive, slightly slanted style.

Emil Q. Javier
Chair, interim Science Council

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Assessment of Challenge Programme Proposals

The Pilot Process

INTERIM SCIENCE COUNCIL SECRETARIAT
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

September 2002

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SUMMARY AND RECOMMENDATIONS

The concept of Challenge Programme is a major pillar in the current CGIAR reform process. The CPs are meant to improve the CGIAR's relevance and impact, achieve greater efficiency and cohesion among the centres of the CGIAR and ultimately mobilize greater and more stable long term financing. The CPs are expected to open new opportunities for CGIAR to articulate its activities with those institutions with similar and related goals and raise the System's visibility in the world stage by identifying with and contributing to the solution of global challenges.

For the first year of their implementation, the Group decided to accelerate the process by taking on on a pilot one-time-basis ten preproposals essentially bypassing the ideas/concepts phase. Out of the ten preproposals, the iSC endorsed, and the ExCo approved, for full proposal preparation three candidate CPs, namely: 1) Unlocking Genetic Diversity in Crops for the Resource Poor, 2) Water and Food, and 3) Biofortified Crops for Improved Human Nutrition.

The iSC has completed the assessment of the three full proposals in the pilot phase. The evaluation process took into account the criteria for Phase III of the CP process as approved by the Group. The assessment benefited from peer review by twenty-one selected scientists as well as from interactions between iSC members, a few donor representatives and observers in the iSC meeting and the lead proponents.

Based on the peer reviewers' and iSC's own comments, the proponents revised their original submissions, resulting in each case improved versions of the proposals.

The iSC is most pleased and gratified to strongly endorse for the Group's consideration the three CPs in the pilot phase. In iSC's estimation, each of the proposals more than adequately meet the requirements of Challenge Programmes and will do the CGIAR proud.

The CP on "Unlocking Genetic Diversity in Crops for the Resource Poor" resonates directly with Plank No. 2 of the new CGIAR vision and strategy of mobilizing modern science such as genomics and informatics to bear on previously untractable difficult-to-address causes of poverty and food insecurity. The CP offers radically new approaches to crop improvement which historically had been CGIAR's principal instrument in achieving the System's goals. Unfortunately, these new technologies so crucial to the future of food and agriculture are increasingly made inaccessible to the developing world. This CP attempts to create a platform of genomics and bioinformatics enabling technologies in the public domain with which to unlock the rich genetic diversity in crops for the resource poor.

The Water and Food CP proposes to launch a very ambitious research, extension and capacity building programme aimed at increasing the productivity of water used for agriculture. Water scarcity is one of the major environment problems in the coming century. Since agriculture is the biggest user of fresh water, it is vital to the planet's future that water productivity in agriculture be significantly enhanced to meet future food production demands.

In terms of scale of effort, the CGIAR centers are relatively minor players in global water research. But the CG System has a range and depth of disciplinary and commodity expertise, networks of partners, choice locations and local knowledge unmatched by any other institution in the world. Thus, the CGIAR is superbly positioned to serve as catalyst, platform, organizer and coordinator of global research on water in its manifold dimensions which is Plank No. 7 in the new CGIAR vision and strategy.

The CP on Biofortified Crops for Improved Human Nutrition brings the realistic promise of significant improvements in nutritional levels for tens and hundreds of millions of poor people who are nutrition-poor and health-poor. From a primary focus on crop yields with the historic successes in rice, maize and wheat, this CP shifts the CG's research paradigm towards nutrient-dense crops to combat hidden hunger by increasing the level and bioavailability of iron, zinc and vitamin A in major staples.

Exploratory work by the proponent centers provides a solid foundation and clear evidence that the biofortification approach has tremendous potential to address nutritional deficiencies among vast populations of the poor. This is a magnificent demonstration of the capacity of agricultural research to push its boundaries beyond factor productivity and food security into other spheres of human endeavor, in this case into human health and nutrition.

OVERVIEW OF CP PROCESS

I. Introduction

Following AGM'01, the Executive Council (ExCo) at its first meeting decided to accelerate the CP process on a pilot, one-time-only basis during the initial year so as to learn more quickly how best to design, assess and manage Challenge Programmes (CPs). The ExCo accepted ten ideas from the centers and endorsed the same to the iSC as preproposals effectively combining Phases I and II of the approved CP process. The iSC was further requested by ExCo to recommend no more than three preproposals for full proposal development.

Evaluation of Preproposals - The proponents were instructed to submit to iSC by 30 November, 2001 (later moved to 12 December 2001) three documents, namely, a concept note, a preproposal, and a plan for full proposal development with funding up to \$200,000 if needed.

The iSC informed the CP proponents of the next steps of the process and proceeded to analyze the materials submitted. To assist the iSC in its task, the iSC commissioned at least two external experts each to review the proposals. The reviewers were asked to apply the 11 criteria required of preproposals approved by the Group which were consolidated by iSC into four categories with differential weights.

Moreover the iSC secretariat in consultation with the iSC Chair prepared detailed briefing notes for each CP. The iSC secretariat notes and the peer reviewer comments were taken into account by the individual iSC members in formulating their assessments.

The iSC then conducted about four weeks of e-mail debate on the merits and demerits of the preproposals with an iSC member serving as moderator.

Adopting a modified Delphi approach, the iSC after two rounds of e-mail exchanges and scorings ranked the ten preproposals in their order of priority. The top three which in fact stood out above the rest were the CPs on 1) Unlocking Genetic Diversity in Crops for the Resource Poor, 2) Water and Food, and 3) Biofortified Crops for Improved Human Nutrition.

These three candidate CPs were subsequently endorsed by iSC and approved for full proposal development by the ExCo.

Evaluation of Full Proposals - The proponents were informed in March 2002 of their selection and were given up to 15 July 2002 to submit their full proposals. The proponents were allowed as much as \$200,000 to help pay for the costs of proposal preparation.

The full proposals received by iSC were about 50 pages long each and contained a Business Plan which spelled out the governance arrangements, resource generation and financial accountabilities. The three proposals were accompanied by annexes of varying length. The Water and Food CP in addition submitted very informative but lengthy background papers. Since iSC was conducting all its business in virtual mode, these voluminous files created problems for some iSC members who had limited e-mail access.

As in the preproposal phase, the full proposals were likewise subjected to external peer reviews. This time however the reviewers covered a wide range of disciplines and problem areas. The Water and Food CP went out to six reviewers; the one on Genetic resources to seven, and the Biofortification CP was dispatched to eight reviewers.

The reviewers were given ten days to go over the manuscripts to keep to the schedule approved by ExCo. The reviewers were guided by the CP Phase 3 criteria approved by the Group which were reformatted into the iSC Guidelines to CP Proponents in Phase III of the Pilot Process (attached). The reviewers were assured of anonymity to secure frank and objective assessments.

Given that one of the criteria for evaluating CPs is whether there are clear and satisfactory arrangements for handling legal responsibilities and full adherence to CGIAR IPR policy, iSC sought the opinion of the Central Advisory Service (CAS) based at ISNAR regarding the adequacy of the CP IPR provisions of the CPs. The CAS advisor's detailed comments were also made available to the proponents.

To facilitate the iSC's work and in recognition of individual expertise and interests, the iSC organized itself into three Working Panels, each assigned to a specific candidate CP. Although iSC members are required to assess all three CPs with equal diligence, the members of Working Panels were expected to pay a little more attention to their respective assigned CPs.

The e-mail exchanges among the iSC members as well as the traffic of queries and responses from the proponents to reviewers were coursed through the iSC Working Panel Chair, with support from the iSC secretariat.

The individual reviewers comments and a preliminary synthesis prepared by the Working Panel Chairs of advanced comments and suggestions received from iSC members were forwarded to the proponents for their consideration and responses. Based on these contributions, the proponents either prepared a revised second draft or a commentary of their planned responses. These essentially replaced their original submissions and were the versions which the proponents presented to iSC at the iSC 83 in end of August 2002 in Rome.

The CP proponents were invited to formally present the CPs before the whole iSC at iSC 83 in Rome. The 45-minute plenary presentations were followed by one hour question-and-answer sessions where the iSC members, some donor observers, the CG directors general and staff present freely participated. The Private Sector Partnership Committee Chair and the CAS IP adviser also contributed actively in the discussion.

The plenary discussions were continued later in the early evening with simultaneous iSC Working Panel sessions to further clarify and iron out outstanding issues.

Based on the discussions, the proponents prepared second and third drafts which were the versions which iSC received, discussed and commented upon in closed session on the final day of the meeting.

This submission of iSC to the Group consists of the individual iSC commentaries and the final versions of the three CP full proposals.

iSC Commentary on the C challenge Programme:

BIOFORTIFIED CROPS FOR IMPROVED HUMAN NUTRITION

OVERALL ASSESSMENT

The iSC strongly recommends approval of the proposal on *Biofortified Crops for Improved Human Nutrition*. The proposal fully possesses the basic features of a challenge programme (CP). It brings the realistic promise of very significant improvements in nutritional levels for tens and hundreds of millions of people, particularly of those who are nutrition-poor and health-poor. From a primary focus on quantity of crop yields (as with the historic successes in rice, maize, wheat, etc.), towards a more nutrition and health related focus, this CP emphasizes the intrinsic quality of crops, and thereby explicitly addresses the ‘hidden hunger’ of the poor. It builds on a solid conceptual, methodological and research strategy developed by the proponents and strengthened during the review process. By broadening the range of multi-sector and multi-disciplinary partners from the North and South, and with good prospects for attracting new sources of non-traditional funding, this CP clearly ‘elevates the game’ for the CGIAR.

The Programme focuses on three nutrients which are limiting in the diets of tens of millions of poor people: iron, zinc and vitamin A. The development of breeding materials and the planned collaborative breeding efforts are of sufficient magnitude and scope to make a major difference in the nutrient content of a significant portion of the mandate crops of the CGIAR. Biofortification through the genetic improvement of crops promises to contribute in a significant and continuing way when used in combination with other methods to improve diets and control disease.

The iSC endorses the focus on conventional breeding techniques for producing nutrient-enriched lines during the first four years in Phase 1 for initial introduction and field nutrition studies. These materials can be fast-tracked for early field tests. The availability of natural genetic variability for use in conventional breeding efforts for most of the target crops appears to be adequate for these initial efforts. It makes good sense scientifically to first exploit the variability already present in each species. The use of these materials permits scientists’ training in nutritional enhancement and allows for quality testing procedures to be put in place without the added burden of public concern of plant quarantine and safety procedures and IPR requirements of GMOs.

Nevertheless, the iSC agrees with external reviewers that there is a vital need for genomics research efforts to proceed in parallel and with close coordination to the overall programme to assure the maintenance of cutting edge science and to provide tools and genetic materials for breeding use as the programme progresses. Longer-term progress promises to be greater with reduced breeding costs as many of these tools and materials come on line. The iSC applauds the openness and transparency of the procedures, planned outputs and their use in Phase 2. This strategy of openness will help to develop confidence among the many consumer and civil sector groups having interest and concern over GMO use and will help in government approvals in recipient countries.

In particular, the golden rice programme has a life of its own, and its separate handling in Phase 1 should be made clear in the minds of Members and the public. The overall programme plan has been well informed by past work with GMOs, both in the North and the South. The high social value of the Phase 2 materials and the openness and participatory approaches to their development, testing and spread promise to enhance acceptance and use.

The external reviewers and the iSC agree that the breeding and genomics work has a very high probability of success for meeting the technology-focused goals as stated. However, there is significant need for research in the more complex area of interaction of social preferences and practices and the complex dietary environment of poor people. The quantification of eventual impact among different groups of poor people is especially challenging, though the proponents are off to a good start with the ongoing human nutrition field studies. The iSC is confident that the Centres and partners involved are up to this challenge but recognizes that, because of the complexity of interactions, this will require considerable research focus and attention from highly knowledgeable specialists. In particular, specification of the adequate counterfactual will be especially challenging. An impact assessment plan must be developed and put in place soon.

The initial partner relationships are appropriate, but the plan for bringing in a wider range of NARS and other partners must be emphasized. The proponents are leaders in the development and use of participatory methods in agricultural research and these will feature in much of the nutrition field work and downstream plant breeding. There appears to be good potential of support from and cooperation with the private sector in this CP.

With respect to intellectual property (IP) aspects, early attention must be given to developing an IP framework to ensure the international public goods status of all of the outputs.

The management structure of the programme is streamlined and straightforward and appropriate for the effort. The budget as proposed also appears adequate and appropriate for the work proposed. The open structure which encourages partner relationships opens the way for considerable flexibility for support. The iSC is pleased with the probability and evidence of new sources of support and applauds the very strong commitment of the coordinating Centres to achieve that high proportion.

DETAILED COMMENTARY

This commentary has been informed by eight reviews from a slate of internationally-prominent scientists and development specialists, open discussion with the lead proponents (CIAT and IFPRI), and discussion with Centre management and staff of both IRRI and CIMMYT. The four Centres have been highly responsive to those reviews.

1. Relevance and Quality

1.1 Relevance of Expected Outputs

a) The proposed research programme aims at delivering outputs that very significantly enhance the objectives sought by the CGIAR, namely poverty reduction, food security, and sustainability of resource use.

The proposed research programme aims at delivering outputs that very significantly enhance the objectives sought by the CGIAR, namely; poverty reduction, food security, and sustainability of resource use. The relevance of the intended outputs and intended impact of the project on the lives millions of poor people and children are clear. Investment in genetic improvement of the levels and bioavailability of these nutritionally limiting elements will continue to make impact as long as the material is in use as breeding material.

The magnitude of impact and the time required for its realization are less clear, and will require considerable further research effort for more firm assessment. These uncertainties relate to the increases in dietary intake possible through biofortification after processing and cooking, and then the bioavailability of those materials in the simple diets of poor people. These suggest the need for more widespread nutritional field studies in Phase 1 as proof of concept.

Specific target populations of poor people are not identified, as the proponents feel that the way forward is to make the materials widely available in breeding parental lines in collaborating and recipient countries and to have elevated nutrient levels present eventually in most modern released varieties. The strategy of openness of the programme is designed toward that end.

The proposal adequately recognizes that there are several complementary approaches to reducing micronutrient malnutrition: biofortification, commercial fortification, supplementation, and more diversified diets. Given heterogeneity of causes of malnutrition across households and differential options to reduce malnutrition available to households according to their specific conditions, there is not a universal solution. Since these different approaches are complementary, optimal mixes will have to be developed across crops, regions, types of deficiencies, and types of households. A priority for the programme should thus be to construct typologies of causes and options to establish the degree of priority to be given to biofortification across regions, crops, types of deficiencies and categories of households for purposes of early programme testing. This will be important not only for assessment of probable impact, but to select priority target populations for early impact as the first improved materials emerge in Phase 1.

b) The proposal shows evidence of consistency with research priorities established by regional research organizations.

Historically, agricultural research by the CGIAR and its NARS partners has been pre-occupied with productivity improvements—increasing absolute levels and stability of yield. Malnutrition was widely recognized by NARS and others as primarily a health and nutrition problem. The Biofortification CP pushes the boundaries of agricultural research beyond the traditional limits of factor productivity and food security and makes direct linkages with the human health and nutrition sectors. Biofortification is slowly being recognized as an

instrument with significant potential to help alleviate micronutrient malnutrition, not as a substitute for the standard approaches such as commercial fortification, diet diversification, etc., but as a complement to them.

c) The expected results can uniquely be obtained through a Challenge Programme as opposed to the other CGIAR research channels, namely Systemwide Programmes and Center Core research.

Exploratory work by proponent centres, via the CGIAR Micronutrient Project, provides a solid foundation and clear evidence that the biofortification approach has tremendous potential to address nutritional deficiencies in vast populations of the poor: It is now known there is considerable variation in the amounts of specific nutrient traits in staples; breeding work is already well underway to incorporate into advance material the desirable genes for higher micronutrient levels; and field level human nutrition studies are now in progress to test the efficacy of the approach.

The linkage of agricultural research and human health goals raises the profile of the international agricultural research system. Successful implementation of this new approach depends on the alignment of objectives and coordinated efforts of institutions with diverse disciplinary perspectives, experiences and skills, hence, the need for a CP. Activities will cover the range from gene discovery to nutritional genomics research, from developing plant breeding tools to crossing and testing various lines for nutritional effects in the field—a complex blend of strategic, applied and participatory research. Critically important is the human nutrition research that must involve NGOs and civil society. Institutional arrangements as required here can only be accomplished through the CP framework and not as a Systemwide Initiative. iSC considers that the CP approach is ideal for bringing various partners together—and will help accelerate the mainstreaming of biofortification in both NARS and CGIAR crop breeding programmes as well as in developing country nutrition and health programmes.

d) The expected outputs are clearly defined and are achievable within the proposed time frame and budget.

Outputs from the genomics and breeding work are clearly specified in detail, with milestones given. In due course, a time-bound work plan and deliverables for all aspects of the work would be developed. These should be provided in logframe format. Prior experience of the proponents in the Micronutrient Project suggests that broad outputs and timeframe are reasonably targeted.

1.2 Quality of Science and Qualifications of the Research Team

a) The research hypotheses are clearly specified in relation to the proposed challenge, and the proposed research methodology is directly relevant to the outputs sought.

Although not presented in research hypothesis terms, the Biofortification CP is based on the premise that by producing staple foods whose edible portions are more dense in bioavailable minerals and vitamins—through the biofortification process—agricultural research can provide farmers and consumers with crop varieties that naturally reduce anemia, cognitive impairment, and other nutritionally related health problems in hundreds of millions of people. In the context of this overall objective, a number of more specific primary objectives

(and implicit hypotheses) for achieving the major goal of this programme are outlined in the proposal. These are related to the selection and breeding of nutritionally improved varieties of major staple food crops, demonstrating the nutritional efficacy of the biofortification strategy, successfully testing and disseminating these varieties efficiently, and measuring the nutritional and other impacts of the nutritionally improved varieties, and achieving a better understanding of how dietary factors determine the bioavailability of micronutrients in malnourished populations in developing countries.

- b) The research is based on state of the arts knowledge in the domain, and the proposal explicitly places itself relative to the most recent advances in the field; and,*
c) The research itself is likely to lead to important advances in science and knowledge.

The proposal is judged to have access to cutting edge science in the genomics, upstream nutritional work of the ARIs and in breeding in the Centres and the key NARS partners. The capacity for state-of-the-art participatory research and excellent policy analysis is also present. CIMMYT and other centres are eager to join IFPRI in the policy analysis work.

A key component for the first phase is the plant breeding work. This is central to long term impact. There is also consensus among reviewers that while there is confidence that the teams can deliver the increased levels of nutrient content in improved varieties, breeding methods and deliverables are not specified. These must come in the early work plans. The relationships to the collaborating NARS must also be defined.

It has been pointed out that the genomics research and biotechnology applications are perhaps not essential for Phase 1 success. The iSC feels that such work is highly important to longer- term application. Background work and modern biotechnology tools and materials are essential for long term progress. The approaches and outputs are clearly spelled out in background documents. Some reviewers expressed concern that such work, being well defined and concentrated in advanced laboratories, will overshadow the breeding, which has far less definition in the proposal. An appropriate balance is important as donors begin to buy in.

The determinants for getting the right balance between bioavailability and quantity increase (in the breeding effort) should be addressed early in the programme. This will inform the genomics research in particular so that a balance is determined between efforts to increase content and those focused on improving bioavailability.

The iSC engaged in considerable discussion with the proponents over the policy for eventual identification of the enriched varieties. There is strong feeling that no attempt should be made to label the materials either genetically or with mandatory market labels. The objective is to have the materials widely available in the marketplace and not to create a potentially high-priced good which poor people would hesitate to purchase. Nevertheless, publicly and privately released seeds could be marketed to growers as of higher nutritive value. Segregation of the commodity in the marketplace will be extremely difficult and will unnecessarily raise costs. The iSC agrees with this strategy.

Given the reputation of the proponents, the iSC believes the expected policy deliverables need to be more ambitious, including early cost-benefit analyses of alternative interventions, and emphasis on the institutionalization of hidden quality traits. Impact assessment capacity must be developed to meet the complex needs of nutritional improvement changes.

There is considerable difference of opinion among reviewers and within the scientific community as to the most relevant models for nutritional quality testing. Ultimately, field studies of target human populations must be done under the coordination and sponsorship of NARS and NGOs. Several studies are either underway or planned for Phase 1 with support identified or already in hand. Those donors who have already stepped forward are to be commended.

d) The core parties in the programme are the best qualified in terms of research expertise and prior research achievements to carry on the research and deliver the benefits.

There is ample evidence that the teams and institutions which are partnered have capacity for cutting edge science. The Centres and ARIs involved have outstanding track records and are clear leaders in the field. The same care must be taken in the awarding of grants for the nutrition work and the expanded breeding efforts.

1.3 Strategy for Utilizing and Applying Results

a) The research proposal is accompanied by an explicit plan for delivery, communication and dissemination of results and outputs, to maximize benefits to CGIAR stakeholders.

There is an explicit plan for delivery and communication of specific CP-generated outputs. A more comprehensive plan showing the sequencing and timing of major milestones and expected outputs under the plant breeding, nutritional genomics, nutrition and policy analysis components will be developed soon after the initial work planning meetings with CP collaborators.

b) The research proposal addresses not only the fundamental scientific aspects but also the applied and adaptive stages of the research, in a realistic manner, and the uptake of research outputs in order to produce high impact outcomes.

The iSC is pleased that the project has made significant provision for policy research aimed at ultimately providing information to NARS on the required policy environment for successfully applying the technologies. Additional policy research for establishing priorities is important.

Several reviewers expressed unease with the lack of detail of information dissemination and outreach, although a communications strategy has been developed by the proponents. The outreach and dissemination activities must evolve to utilize many of the newer scientific approaches which go beyond a “linear” extension approach. An iterative and participatory process at the level of NARS and their plant breeders is as essential as for eventual public acceptance. Reviewers disagree on this issue. A concern was expressed that the communications approach described stresses “inform and educate” method which minimizes dialogue and informed consumer decisions. An approach based on co-learning is seen to be more appropriate. Others see “social marketing” as not suitable when issues are highly emotion-laden and value-rich.

The Phase 1 materials will be based on naturally-occurring variability of the nutrient traits and should not raise undue alarm. However, as the CP progresses, genetic engineering techniques and materials will come on line. The outreach and dissemination strategies,

therefore, should be designed for informed decision-making and acceptance of highly nutritious materials in advance of the GMOs. This would help eliminate the “hard sell” of a linear approach that has been pushed in the early days of GMO introduction in the North. The coordinating Centres are well aware of this need and have indicated their full intention to move in this way.

1.4 Collaborative Arrangements and Beneficiaries' Involvement in Research

- a) The CP involves at least 2 CGIAR Centers and at least 2 NARS from the South. In addition other institutions from the North and South are slated to handle specific programme components or projects; CPs should involve the best institutions from the North and the South that can contribute to solving the problem. The institutions from the North should preferably bring their own resources to the consortium; and,*
- b) The proposal gives clear evidence that consultations have been held with proposed research partners, in particular in the regions of relevance. The synergies, value added and mutual benefits among partners are clear.*

The proposal is broad in its partnerships among CGIAR centers, NARS and key ARIs. Twenty-nine institutions from developing countries and five from developed countries (not including the active partners) have indicated their support for this Programme. There was also broad participation in the planning process. A list of in-kind resources and capacities brought to the consortium by institutions from the North are listed in the appendix.

The ultimate roles of NARS and NGOs are focused on breeding, release of materials and in the multiple facets of nutritional testing and impact assessment. The Asian example on iron-rich rice in Section 5.2 is a good description of the role NARS and NGOs can play in this endeavor. In the case of the applied nutrition trials involving the religious sisters in the Philippines there would have been disastrous political consequences were it not for the fact that the experiments were NARS and civil-society-initiated activities, and not driven by IRRI and other foreign institutions. The proponents are fully aware of the advantage of involving the NARS, NGOs, farmers' associations and consumer groups as early as possible in the research process.

- c) If competitive grants are to be used, procedures under which this would be done are clearly explained.*

A process will be developed by the PAC for establishing a competitive grants scheme for at least 25% of the programme funds, which will principally focus on breeding objectives and nutrition effectiveness and efficacy studies, as well as some components of the nutritional genomics work. These competitions will be open to all organizations.

- d) Participatory research, use of beneficiaries' knowledge and experiences, and beneficiaries' interest in and ownership of the research subject are outlined and pursued by the CP starting with the planning stage.*

As CIAT is regarded as one of the pioneers in the field of participatory research methods, this bodes well for the CP. However, the participatory process must be put in place soon to bring farmer organizations in up front as key participants. The steps for doing this should be specified. The iSC fully recognizes that at this stage all procedures and processes cannot and probably should not be in place. They must evolve.

2. Governance and Budget

2.1 Governance and Management

- a) Governance and management arrangements are defined explicitly in the joint venture agreement and in the Business Plan. They are flexible and adaptable to the specific needs of the CP and the structures are appropriate to the size and nature of the programme; and,*
- b) The CP is to be coordinated by an “independent” manager, operating on behalf of the core parties with clearly defined reporting responsibilities. The Coordinator is to be recruited from a core party or from outside, and appointed for a fixed term under the terms and conditions of an agreed core party.*

The proposed governance and management structures are appropriate and explicitly defined. The lead proponents, CIAT and IFPRI, plan to enter into a joint venture or similar agreement to jointly govern this CP. The major issues to be addressed in the joint venture have been identified. The open structure which encourages partner relationships opens the way for considerable flexibility for participation and support.

The assignment of fiscal legal responsibility to existing Centres seems a rational approach for a CP that has been designed for fast-tracking. The complexities of setting up a legal entity from scratch in a programme that will cover considerable downstream in-field activities in numerous countries would be daunting and time-consuming. The predominant global capacity in genetic improvement of the key species is clearly with the Centres. It is strongly advised that legal agreements be made with all grant recipients that specify benchmarks and outputs. The agreements with collaborating Centres should be in writing.

The Project Advisory Committee (PAC), to be appointed by the lead Centres, will have delegated authority from the core parties to provide both strategic oversight and advocacy for the CP. There has been some reviewer unease with this, but the iSC feels that both roles are necessary and if managed correctly will not be in conflict.

- c) The arrangements for administrative support (to be provided by one of the core parties) are satisfactory. The Board of each core party is accountable for the input resources and delivery of agreed outputs of that core party; and,*
- d) There are clear lines of accountability and clear institutional arrangements spelling out roles, responsibilities, rules of operation, and conflict resolution in a formal agreement signed off at the appropriate legal level by each core party or CP associate party.*

The coordinating role of the two lead Centres provides a streamlined format for management and accountability. This seems appropriate as long as the intended pattern of openness and inclusion of a broad array of partners having a role in planning and priority setting as well as in implementation is carefully followed by the coordinating Centres. The Project Management Team, consisting of a Programme Leader (PL) and two coordinators (for Breeding & Biotech and Nutrition) will coordinate/manage the programme’s overall operations. The PL will hold a joint appointment with CIAT and IFPRI, while the programme coordinators will be hired and based at different Centres.

The arrangements for administrative support are to be divided between the core parties and appear satisfactory. In the event of a major conflict within the PAC or within the project management team (PMT), a process for resolving the dispute has been agreed upon.

The scientific independence of the PAC must be maintained by appropriate selection of its membership. Those members must represent interests from both the South and North. PAC will have delegated authority from the CIAT and IFPRI Boards and is expected to maintain close communication with the DGs of those centres, who in turn report to their respective Boards and to the CGIAR Executive Council.

e) There are clear and satisfactory arrangements for handling legal responsibilities and there is full adherence to the CGIAR's IPR policy.

As biotechnology tools are developed it must be assured that third party IPR holders do not have monopoly control over the resultant materials. Evidence of IPR legal capacity and approaches was not sufficiently elaborated on in the proposal but discussion with the proponents revealed their clear recognition of the critical importance of IP management for the success of the CP. Strategies should be devised for assuring that the materials are not only available to participants for research use, but for eventual release within national programs. There is acceptance of the desirability to maintain all of the parental material in the public domain.

A summary review by a CAS/ISNAR IPR specialist has been provided to the proponents for advice as they move forward to construct an IP framework

2.2 Performance Evaluation and Impact Analysis

a) Internal peer review mechanisms for quality and relevance and for performance evaluation are present and sound; and,

b) Procedures are in place for the continuing monitoring of progress and adjustments of the programme (as needed) in the course of implementation.

Annual coordination meetings will bring together the entire group of collaborating organizations to review progress on work plans, align and coordinate goals and objectives for the next year's programme of work, identify obstacles and suggest solutions or course corrections. The PAC will meet to review the results from these meetings and make recommendations on strategic priorities and directions for the coming year. Ultimately, they are responsible for ensuring the scientific rigor of the planned and executed work.

The establishment of peer review committees to ensure independent and transparent selection of competitively awarded grants within the CP will help to ensure that the best qualified teams available are engaged in the research programme.

c) Indicators are identified and benchmark information is available to measure project impact.

The impact analysis intent is indicated, but considerable attention must be paid to developing a strategy and identifying methods. Several of the external reviewers' comments are excellent in this regard. The beneficiaries must be identified and this will obviously depend on suggested priority-setting research. The iSC believes there should be close interaction

with the Standing Panel on Impact Assessment (SPIA) of the Science Council as the impact assessment framework evolves. The required added rigor of impact assessment for such complex technologies and strategies will prove challenging, requiring new and innovative approaches capable of differentiating among the several levels of impact from spread of varieties to consumer availability and consumption. It will require the development of institutional capacity, both within Centres and the NARS.

d) The CP proposal should include an internal time-bound work plan on the project's progress, specifying stages and milestones, with intermediary deliverable products subject to independent peer reviews.

The general activities and broad outputs defined thus far within the indicative timeframe are appropriate. A more comprehensive work plan showing the sequencing and timing of major milestones and expected outputs under the plant breeding, nutritional genomics, nutrition and policy analysis components will be developed soon after the initial work planning meetings with CP collaborators.

2.3 Budget and Finance

a) The business plan outlines a strategy to mobilize new resources (in cash and in kind), considering equity in the relation between benefits and costs of the programme, and the need to balance contributions between North and South; and,

A detailed description of the fund-raising strategy and range of past and current activities is included in the proposal under the Business Plan. These appear sound and efforts have already generated intent of support from prospective donors. CIAT and IFPRI, on behalf of all collaboration organizations in the programme, are partnering in their efforts to mobilize new sources of funding.

b) The proposed budget and its allocation are appropriate.

The overall indicative budget figures appear to be adequate for undertaking the broad activities listed in Table 13. In due course, a more detailed budget should be developed linked to specific outputs for all components of the programme, i.e., similar to that specified for the nutritional genomics work (found in the background paper).

The iSC endorses the Grand Total Budget (\$46.3 million for Period 1) rather than the Base Budget (\$38.2 million) as the former includes two key activities, i.e., \$4.9 million for pre-breeding feasibility studies for ten Phase 2 crops important in the diets of those suffering from micronutrient deficiencies—but for which the knowledge base for biofortification has yet to be developed, and, \$3.2 million specifically designated for Regional Collaboration. The latter would be available on a competitive basis to national and regional programmes with proven capacity in core programme areas such as nutrition, breeding/biotechnology, policy analysis, and in consortium leadership. The iSC believes both activities are too important to leave out.

c) Preliminary contacts confirm that there is sufficient donor willingness to commit funding for the first 2-3 years of the programme.

The iSC is pleased with the evidence of high probability of new sources of support and applauds the very strong commitment of the coordinating Centres to achieve a high proportion of support from non-traditional sources. Furthermore, preliminary assessments by the iSC indicate good potential of support from, and cooperation with, the private sector. These need to be explored further.

SUMMARY

The many hypotheses and assumptions upon which this research and development are based are clearly outlined in the proposal. The iSC strongly agrees that the approach is sound. The planned research of Phase 1 is specifically designed to reinforce and quantify those assumptions in proof of concept testing.

The proposed CP meets all of the criteria of a good challenge programme. It has potential for global impact, specifically focused on the poor. It has good promise of new money from the nutrition donor community. It clearly elevates the game in bringing a major focus to nutritional content of the CGIAR crops. The iSC is pleased to most strongly endorse the proposal for approval and sustained donor support.

iSC Commentary on the Challenge Programme:

UNLOCKING GENETIC DIVERSITY IN CROPS FOR THE RESOURCE-POOR

OVERALL ASSESSMENT

The iSC strongly recommends approval of the CP Proposal “Unlocking Genetic Diversity in Crops for the Resource Poor”. Responding directly to Plank Two of the CGIAR’s Vision and Strategy—mobilizing modern science to bear on the difficult-to address causes of poverty and food insecurity—this CP offers radically new approaches to crop improvement which had been the CGIAR’s principal instrument of impact on alleviating poverty, enhancing food security and moderating environmental degradation. By enhancing public access to and greater utilization of the rich diversity of genetic resources and new plant breeding methodologies and tools, this CP significantly strengthens the research heartland of the CGIAR. The seven external reviewers, who assessed the merits of this proposal, all commended it as a highly valuable and relevant research initiative and recommended its endorsement as a CP.

This CP takes a strategic approach in creating knowledge on a technological platform for the benefit of plant breeding across a range of crops and traits. The most advanced science in comparative biology will be used to analyze the diversity in the CGIAR and NARS germplasm collections, identify desirable genes, develop ways for detecting them and to make initial gene transfers by hybridization and transformation into locally adapted genotypes.

The research concept, which is based on genetic similarity of crops despite species boundaries, presents a new paradigm with potentially huge impacts on the way plant breeding is conducted and able to deliver. Applying the scientific revolutions in genomics and informatics to exploit the largely untapped resource in germplasm collections is expected to result in a quantum leap forward in crop improvement all over the world and potentially for all crops.

The proponents have included tolerance of drought stress – a notoriously elusive breeding target – as a case for demonstrating the application of the CP’s outputs. This is relevant in virtually all regions of the developing world and for nearly all economically important crops. It is especially relevant to many areas in South Asia and Africa. Progress in drought research is likely to benefit also research on other abiotic stresses.

Specifically, this CP will produce a public platform of enabling technologies and tools for crop improvement programmes in the NARS, CGIAR and elsewhere. It will develop information systems and databases, and enhanced capacity of NARS scientists and others to apply genomic sciences in their own research and breeding programmes. The genomic information and breeding tools deriving from this research are also directly relevant to the CP on Biofortification and to the crop-water-productivity component of the CP on Water and Food.

This CP proposal presents an international multi-partner research programme, based on the complementary strengths and assets of the CGIAR Centres, NARS and advanced research

institutions—the founding partners of the initiative. But the proposal is open to additional partners within and outside the CGIAR, who could participate in different capacities to advance the goals of the CP. Through partnerships, the CP will involve significant interaction between scientists from developing and developed countries, promote fruitful collaboration between the public and private sector for technology development and product deployment, and offer multiple opportunities for capacity strengthening and training.

This research could not be done as effectively and expeditiously by any of the partners alone nor as a CGIAR systemwide programme. Quite apart from sharing the prohibitive costs, this programme will capture significant synergies in bringing together the broad range of partners and capacities therein, thus satisfying one of the primary criteria set for a CP.

DETAILED COMMENTARY

This commentary has benefited from peer evaluations of seven selected scientists and development specialists and from discussions between iSC and the lead proponents (CIMMYT, IRRI and IPGRI). The proponents have been highly responsive to the comments and suggestions of the iSC and to external peer reviews.

1. Relevance and Quality

1.1 Relevance of Expected Outputs

- a. The proposed research programme aims at delivering outputs that very significantly enhance the objectives sought by the CGIAR, namely poverty reduction, food security, and sustainability of resource use.*

The expected outputs from this CP will contribute significantly to the overall goals of the CGIAR, namely poverty reduction, food security, and sustainability of resource use. They will do so through increasing the effectiveness of crop improvement at national and international levels by enabling and promoting the use of genetic resources. An integrated public platform of technologies will be created through the generation, dissemination, and application of comparative biological knowledge for the benefit of all plant breeding.

The outputs from the application of the platform technologies will enhance breeding of traits that, due to their complexity and large genotype x environment interaction effects, have so far been extremely difficult to improve. Many such traits, e.g. drought tolerance, are essential for improving productivity of agriculture in poverty prone areas of the world. The CP will enhance the understanding of gene functions and genetic control of traits which are particularly relevant in developing regions, and thereby increase the productivity of agriculture and quality of the products.

The common databases and systems to share and compare information from genetic collections, breeding and genomics are extremely valuable for breeding and related research in the CGIAR and in other institutions. Compatible information systems will serve other needs than just those of the CP and, through capacity strengthening and development of easily accessible systems, help narrow the “digital divide” that separates the developing countries from the developed world.

- b. *The proposal shows evidence of consistency with research priorities established by regional research organizations.*

The objectives and focus of this CP are consistent with the aims and priorities of the NARS and many regional organizations that emphasize increasing agricultural productivity, enhancing genetic improvement, and developing stress tolerance. Development of planting materials adapted to stress prone areas is a high priority defined at the regional level by NARS and regional research associations. This CP, with its strong emphasis on human and institutional capacity strengthening will also provide great service to the increasing number of national research institutions which are trying to build capacity in advanced breeding methodologies.

- c) *The expected results can uniquely be obtained through a Challenge Programme as opposed to the other CGIAR research channels, namely Systemwide Programmes and Center Core research.*

The scope of this CP is well beyond the capacity and resources of any single institution within the CGIAR or outside it. The programme is far too broad by scope, objectives and governance and coordination requirements to be carried out through a Systemwide programme approach. All recent advancements in genome mapping have required multi-institutional collaboration. The CGIAR Centres, NARS and Advanced Research Institutes involved in this CP bring together highly complementary skills, resources and specialization, such as expertise on genomics and bioinformatics, genetic resources management and use, pre-breeding and crop improvement and knowledge of the specific conditions and constraints of the developing environments, institutions and individual farmers.

- d) *The expected outputs are clearly defined and are achievable within the proposed time frame and budget.*

The research outputs are defined in generic terms. This is a deliberate strategy to keep the options open as the programme is expected to deliver generic platform technologies for a number of crops and uses. In the 5-10 year time-frame, the programme will be creating intermediate technologies and information including well characterized genetic stocks, marker systems, genetic maps, candidate genes for important traits and information systems integrating genetic and phenotypic information with genomic information. Training and capacity strengthening are also major outputs. Given the required resources, the strong research tradition and expertise of the members of the consortium, the iSC is confident that the CP can deliver the expected outputs within the proposed time frame and budget.

The proposed technology platform is potentially useful for all crops. However, the iSC agrees with the external reviewers that it is unrealistic to initiate work on all 22 CGIAR mandate crops. A very important initial step in the implementation of this programme will be the prioritization of crops based on some rationale or criteria, such as the amount of available genetic analysis or availability of sufficient accessions for the study. This will be an essential activity during the drawing of the detailed work plans. In their interaction with iSC, the proponents made clear that priority crops, research questions and approaches will be discussed in consultation workshops with a broad range of partners who are expected to participate in different capacities. Participation of NARS in the priority setting will enhance the relevance of the products to specific regions and the ultimate beneficiaries, the poor farmers.

1.2 Quality of science and qualifications of the research team

- a) *The research hypotheses are clearly specified in relation to the proposed challenge, and the proposed research methodology is directly relevant to the outputs sought*

The iSC looked into the scientific merits of this proposal by assessing the general concepts and methodologies embodied in the proposal and the overall strategy of developing science-based enabling and intermediate technologies in the public domain for enhancing genetic improvement. The conceptual bases for the CP is sound showing the application of existing and accumulated knowledge in genetic resources, genomics and crop improvement as a continuum and drawing from other disciplinary and evolving areas of expertise, such as bioinformatics, to develop methods and research materials for breeding new varieties. There is a logical sequence from genomic and phenotypic analysis to identification of important alleles with known functions and validation of these products for use in breeding programmes.

The underlying hypothesis in the CP relies on what is known of genetic similarity between crops and thus in the potential to apply knowledge from model crops to research on food crops. It also relies on the most advanced knowledge of genetic and metabolic systems of organisms that allow identification of control genetic switch points affecting multiple downstream genes. Both these avenues are extremely important for developing platform technologies that make it possible to design highly effective breeding strategies for any crop. The advanced research institutions involved in the CP are directly engaged in advancing the basic scientific knowledge that is used in this programme.

- b) *The research is based on state of the arts knowledge in the domain, and the proposal explicitly places itself relative to the most recent advances in the field*

The genomics, genetic improvement and bioinformatics components of the research are based on the state of the arts knowledge, which clearly are part of the on-going activities of the founding partners. The CP proposes to use a number of methods of discovering genetic functionality to allow gene deployment, such as high-throughput genotyping, micro-arrays and ESTs. The founding partners have impressive genomic resources and human capacity related to these methodologies and several of them are involved in expanding the scientific knowledge in biology and genetics. The iSC is confident that the partners representing the very elite in the fields of genetic research and crop improvement will be employing the best of available technologies within the funding parameters. Once the concrete research hypotheses and workplans have been developed, the Science Council will monitor the external scientific assessment of the quality, feasibility and potential impacts of the different research components.

A particular strength of this proposal is that the research is based on the efforts, experience and achievements of various existing multi-institutional research consortia such as those on legume and *Musa* genomics and several on cereals genomics. Similarly, the existing genetic resources information and phenotypic data already incorporated in information systems, such as SINGER and International Crop Information System (ICIS), form a strong basis for the bioinformatics work and for Subprogramme 4, in particular. This subprogramme has an ambitious target to integrate genetic resources information to phenotypic and genomic information for creating a comprehensive and dynamic information system. The new way of

combining and sharing genetic information and analysis systems is likely to give a boost to developing bioinformatics capacity in the Centres and in the participating NARS, which has already been demonstrated in some existing CGIAR-NARS biotechnology networks.

The proponents had been very careful in stipulating that transgenic varieties are not expected to be a major output of the CP but underlining their invaluable use as a research tool. However since optimal or critical genes and gene systems maybe entirely lacking in a species, and because transformation systems have already been developed for most CGIAR mandate crops, iSC believes that genetic transformation should be openly considered as one important means of gene deployment, in addition to using it for validation of gene expression.

The reviewers and iSC noted a lack of mention of expertise in related disciplines such as ecology and plant physiology particularly given the focus on adaptation to drought stress as proof-of-concept. Expertise on other crops such as legumes and root and tuber crops was also not clearly mentioned. Both of these reservations have been addressed in the final proposal.

c) *The research itself is likely to lead to important advances in science and knowledge*

The CP has the potential of generating significant novel scientific discoveries by revealing solutions for tracking complex traits like drought. The application of comparative biology to studying genetic resources is also likely to generate new type of knowledge and understanding and can be seen as a model for similar activities elsewhere. The main emphasis in this CP, however, is on applied aspects of genomics. It proposes to adopt information and materials arising from basic research in molecular biology and draw from phenotypic data accumulated by CGIAR Centres from testing vast numbers of segregating populations, breeding lines and cultivars in very diverse environments in all developing regions.

1.3 Strategy for Utilizing and Applying Results

a) *The research proposal is accompanied by an explicit plan for delivery, communication, and dissemination of results and outputs, to maximize benefits to CGIAR stakeholders*

The main mechanism for delivery will be collaborative research through partnership with national programmes and individual scientists from the developing countries and through capacity strengthening and training. Two of the five subprogrammes are designed to have major responsibility for communication and dissemination of the results and for delivery of the new technologies for application. Following the interaction with the iSC, the CP proponents established a specific Subprogramme 5 to give particular attention to capacity strengthening, which will also feature in each of the other subprogrammes. The iSC considers that the emphasis now given to technology transfer, particularly in Subprogramme 3 and to capacity strengthening in Subprogramme 5, increases this CP's profile as an impact oriented research programme, which will be able to deliver its products effectively through its NARS partners thus maximizing the benefits to CGIAR stakeholders.

The Subprogramme 3 has a sharp focus on methodology validation and technology transfer. The latter will include demonstration to NARS breeders of the protocols to select desired

traits and transfer of the new technologies, including new genetic materials under material transfer agreements (MTA). Technology validation done under representative conditions of the targeted farmer environments provides also one component of the strategy for communicating and delivering the results to assure effective adoption. Making new alleles available in agronomically and horticulturally superior varieties selected and adapted by the targeted farming communities will speed up the dissemination of the important traits. The iSC commends the proponents for their plan to develop at an early stage and continuously maintain dialogue between policymakers, regulators, NGOs, and farmers about the types of products ultimately deriving from this work.

The CP will produce international public goods (IPG) at all levels: data, processes, information, methodologies and tools. The CP emphasizes access to and freedom to operate with all the tools produced for crop improvement and breeding related research. The processes of benefit sharing have not yet been specified but the CP is committed to ensuring that benefit-sharing arrangements under the International Treaty on Plant Genetic Resources for Food and Agriculture accrue to developing countries, where and when appropriate. Publishing is seen as an important means of communicating new innovations. The CP proponents have responded to the recommendations of the external reviewers and the iSC by planning early consultation with the Private Sector Committee of the CGIAR and private sector enterprises to design suitable modalities for engaging the private sector that fit with the IPG nature of the research initiative.

- b) *The research proposal addresses not only the fundamental scientific aspects but also the applied and adaptive stages of the research, in a realistic manner, and the uptake of research outputs in order to produce high impact outcomes*

The conceptual basis for the CP consists of three separate but interconnected components. As explained in the proposal, the CP addresses the interfaces of these three components. The CP emphasizes applied aspects of genomics, largely by adopting information and materials arising from basic research in molecular biology. The CP will also draw upon and contribute to other disciplines such as bioinformatics. These activities will figure prominently in Phase I of the CP. During Phase II the optimal alleles and novel genes identified in Phase I which will directly improve productivity or quality will be incorporated into elite lines and deployed in the public domain using traditional and modern methods of gene transfer. The most promising materials will be advanced to on-farm trials for evaluation of productivity and acceptability to growers and consumers.

1.4 Collaborative arrangements and beneficiaries involvement in research

- a. *The CP involves at least 2 CGIAR Centers and at least 2 NARS from the South. In addition other institutions from the North and South are slated to handle specific programme components or projects; CPs should involve the best institutions from the North and the South that can contribute to solving the problem. The institutions from the North should preferably bring their own resources to the consortium.*

This CP has 10 founding partners including three CGIAR Centres, two NARIs and five advanced research institutions (ARIs). The programme will invite additional partners that include other CGIAR Centres, NARS and ARIs, and also individual scientists from any institution, as long as the collaboration directly supports the goals of the CP. The initial implementation including prioritization of research objectives and drawing the specific

workplans will be a process open to interested partners who will collaborate in different capacities bringing intellectual contribution and insights to the planning and priority setting, and scientific capacity and infrastructural contribution to the implementation. The competitive grants programme will also offer an avenue for participating in the research.

Among the founding partners there are only two national institutes from the developing world. The iSC strongly recommended that the CP proponents involve additional NARS in priority setting, in implementation of the programme and in applying, communicating and disseminating the results. In the final proposal, the technology transfer and capacity strengthening activities will involve close participation with several NARS, in addition to the two founding NARS members, particularly those that have some capacity in advanced breeding technologies and interest in building this capacity.

The founding partner institutions are contributing in-kind the equivalent of nearly 6 million US\$ annually. The contribution of the Chinese Academy of Agricultural Sciences (CAAS) in scientist years (7.8 full-time researcher equivalents) is particularly noteworthy. In addition, these institutions bring along considerable genetic and genomic resources and know-how.

b) The proposal gives clear evidence that consultations have been held with proposed research partners, in particular in the regions of relevance. The synergies, value added and mutual benefits among partners are clear

Extensive consultations among the founding partners have helped in designing the direction, strategy and governance of this proposal. Furthermore, the development of the proposal has been preceded by workshops of other relevant consortia, such as the CGIAR-US Cereal Genomics Initiative. The objectives, particularly research on drought as a primary target of the CP, reflect the priorities of most if not all national research organizations. Additional CGIAR centers, NARs and others, will be invited to participate in research planning workshops scheduled for early 2003, to help identify research priorities and involvement in specific research areas. The private sector, as represented by the CGIAR Private Sector Committee and individual companies, is expected to contribute during the planning meetings.

c) If competitive grants are to be used, procedures under which this would be done are clearly explained

Competitive grants and commissioned research will be the major ways of allocating new funding and involving new partnerships. The Programme Steering Committee will be responsible for approving the guidelines for the competitive grants portfolio, defining the procedures to be followed and approving the grants to be awarded. The research proposals must be congruent with the objectives of the CP and clearly focused on the CGIAR mission.

- d) *Participatory research, use of beneficiaries' knowledge and experience, and beneficiaries' interest in and ownership of the research subject are outlined and pursued by the CP starting with the planning stage*

Scientists from the founding partners as well as from additional NARs and CGIAR centers will participate in the research planning workshops to help identify research priorities and drawing up of the work plans. Since the actual breeding and selection and on-farm trials won't occur until Phase II of the CP, active participation of the beneficiaries (i.e. the farmers) will occur much later in the life of the CP. The proponents are fully cognizant of the need to anticipate right from the conception of the goals and outputs the socio-economic impacts of the CP. Starting at an early stage and continuing throughout the life of the CP, they plan to inform and educate not only farmers but also policymakers, regulators and NGOs of the goals and nature of the materials the CP will produce.

2. Governance and budget

2.1 Governance and management

- a) *Governance and management arrangements are defined explicitly in the joint venture agreement and in the Business Plan. They are flexible and adaptable to the specific needs of the CP and the structures are appropriate to the size and nature of the programme, and;*
- b) *The CP is to be coordinated by an "independent" manager, operating on behalf of the core parties with clearly defined reporting responsibilities. The Coordinator is to be recruited from a core party or from outside, and appointed for a fixed term under the terms and conditions of an agreed core party.*

The proposed governance and management arrangements are explicitly spelled out in the joint venture agreement and are comprehensive and thorough. The founding partners initiating this CP will provide leadership in their capacity as members on the Programme Steering Committee (PSC), which provides overall governance and management for the CP. The PSC will meet twice a year and act very much like a CGIAR Centre Board. The governance model proposed is based on experiences with other similar international consortia and it appears sufficiently flexible to the specific needs of the CP. Dr. Ismail Serageldin, former Chair of the CGIAR and World Bank Vice President, ESSD had been selected as independent Chairperson of the PSC.

The joint venture agreement describes the steps in establishing and organising the CP and the roles and responsibilities of the PSC and the Programme Advisory Committee (PAC). The PAC will provide independent scientific advice to the PSC. Membership will be decided by the PSC in consultation with stakeholders.

The Director of the CP who will be an eminent scientist recruited on a full-time basis will be an *ex officio* member of the PSC and accountable to it. The main function of the Director is to provide leadership to the CP. The Director plays a major role in ensuring coordination, integration, and communication across research activities as well as providing a public interface to the CP. The ISC notes that the personality, leadership ability and scientific credibility of the CP Director are crucial for the success of the CP. Appointment through an open international recruitment procedure is envisaged for securing the independence and impartiality of the Director.

Research coordination across the CP will be achieved through a Programme Research Management Team (PRMT), which focuses on the conduct, integration and coordination of research activities. The PRMT is composed of the CP Director, the Lead Scientists for each of the five subprogrammes, and key researchers for specific research projects.

- c) *The arrangements for administrative support (to be provided by one of the core parties) are satisfactory. The Board of each core party is accountable for the input resources and delivery of agreed outputs of that core party, and ;*
- d) *There are clear lines of accountability and clear institutional arrangements spelling out roles, responsibilities, rules of operation, and conflict resolution in a formal agreement signed off at the appropriate legal level by each core party or CP associate party.*

The CP Director will be assisted by administrative and other support at the host institution. The CP joint venture agreement describes in some detail the role of the Host Agent in establishing and overseeing the operation of the accounts, making payments and managing assets on behalf of the CP. (The CP will appoint a Founding Member or other party to act as Host Agent.) The rules of operation and procedures for risk allocation, changing and terminating relationships, conflict of interest, dispute resolution and arbitration are also clearly established.

The PSC will have both authority and responsibility to make binding decisions on the Founding Members as far as the operation of the CP is concerned. Decisions on some of the actions of the PSC may require unanimous agreement, whereas others will be reached by consensus.

- e) *There are clear and satisfactory arrangements for handling legal responsibilities and there is full adherence to the CGIAR's IPR policy.*

The joint venture agreement describes the legal arrangements within the CP. The CP will both use and produce intellectual property (IP) assets and IP management is carefully addressed in the agreement. Nevertheless, the iSC suggests that, at an early stage, more detail with respect to the guidelines to be adopted by scientists participating in the CP would enhance the IP planning/management. The iSC believes it is very important that the CP provides stewardship in matters such as IP management and related capacity strengthening and development of processes for access and benefit sharing. The iSC is pleased to note that the CP will be guided by CGIAR policies on the use of genetic resources and abide by all relevant international agreements, including the Convention on Biological Diversity, the International Treaty on Plant Genetic Resources for Food and Agriculture, and the 1994 FAO-CGIAR Centre agreements. The CP is likewise advised to take advantage of the services of the CAS-IPR facility based at ISNAR.

With respect to biosafety, all research under this CP will be conducted under established guidelines and will follow institutional approval processes. In addition, any GMOs that result from the work of the CP will be evaluated and used only in countries that have appropriate biosafety legislation and protocols in place.

2.2 *Performance Analysis and Impact Analysis*

- a. *Internal peer review mechanisms for quality and relevance and for performance evaluation are present and sound.*
- b. *Procedures are in place for the continuing monitoring of progress and adjustments of the programme (as needed) in the course of implementation.*

The structure and management of the CP provide opportunities at different levels for rigorous review and assessment of its performance. The PSC will have primary responsibility for the overall performance of the CP. This committee will establish performance criteria to determine the progress of the CP in achieving its objectives. The CP will be advised by the PAC which will provide independent scientific advice to the PSC. A dynamic process will be used for engaging different partners in different roles and using the competitive grants process and commissioned research as tools for directing the programme in the course of implementation.

The PSC will also evaluate specifically the performance of the Director and lead sub-programme scientists. The lead scientists and key researchers are expected to meet regularly (convened by the Director) to discuss research issues and progress. An annual research meeting will be held for participants in the CP to review research progress and discuss related issues. This will also be an opportunity for stakeholder to interact with CP researchers and help ensure that the beneficiaries of the work of the CP contribute to its research planning.

The PSC will run the competitive grants programme, including establishing guidelines for it, which the iSC sees as an effective means for *ex ante* quality control.

- c. *Indicators are identified and benchmark information is available to measure project impact.*

The research of the CP will not produce and release finished crop varieties for farmers. It will produce new genetic resources, make the initial gene transfers to locally adapted germplasm, and then transfer the derived materials to crop improvement programs, especially of the NARs and CGIAR centers.

In the CP business plan, the Program Steering Committee, with the assistance of the Program Advisory Committee, is expected to develop the performance indicators that will form the basis for *ex ante* and *ex post* impact assessment. Among the expected impacts of CGIAR work, the methodology for impact assessment of improved varieties has received a great deal of attention (see Evenson and Gollin, 2001). The proponents are very familiar with this work and are well-advised to install the appropriate benchmarks for impact assessment as early as possible.

- d. *The CP proposal should include an internal time-bound work plan on the project's progress, specifying stages and milestones, with intermediary deliverable products subject to independent peer reviews.*

Performance and progress monitoring will be conducted at different levels of CP management, Subprogramme Lead Scientists being responsible at that level for reaching milestones and targets. The Programme Steering Committee will administer the

commissioning of research, awarding research grants through a peer review process and approving additional research projects.

The sequencing of the various major outputs expected are outlined in the proposal, but a time-bound work plan, indicating specific stages and milestones and intermediate deliverables awaits the outcome of the initial research planning and priority setting with all CP partners. The iSC recommends that the CP use logframe planning, similar to that used by Centres in their Medium-Term Plans. Milestones and outputs must be clearly documented and communicated and all outputs, including publications which have a contribution from the CP, must appear in the CP's annual reporting, in addition to being reported for each individual partner organization.

2.3 Budget and finance

- a. The business plan outlines a strategy to mobilize new resources (in cash and in kind), considering equity in the relation between benefits and costs of the programme, and the need to balance contributions between North and South.*

The founding partners bring to the table both human and infrastructure capacity and significant genetic and genomic resources. Their in-kind contribution in full-time researcher equivalents is 25 scientist-years. This draws on the tremendous capacity resident within the key NARS partners, EMBRAPA and CAAS, complementing that of the ARIs and CGIAR Centres. In addition, the CP requires annually 10 million US\$ of new funding (as a minimum), which will be allocated through competitive grants programme and contractual research. The iSC notes that the founding partners have several on-going discrete research projects, which will contribute to the CP and benefit from the overall coordination and synergy. It is also highly probable that it will be possible to attract new funding from non-traditional sources, such as national research academies and science ministries. The advanced research institute partners have much experience in fund raising through competitive grants programmes.

- b. The proposed budget and its allocation are appropriate*

The overall budget appears to be quite modest considering the opportunities to cover the many important areas of research within this CP. A considerable part of the budget will come in the form of in-kind contributions, which thus far are detailed for the founding partners, but are likely to increase as additional partners are engaged.

Although the budget plan is indicative at this stage, modifications will be made subject to workplans developed after the initial planning meetings. At that point, the full range and roles of partners and the research priorities and methodologies will be clearer.

- c. Preliminary contacts confirm that there is sufficient donor willingness to commit funding for the first 2-3 years of the programme.*

The proponents have had a range of discussions with donors to assess their interest in and support for the CP. The iSC is convinced that good opportunities do exist for receiving significant support for CP activities ranging from basic to applied research, including the specific drought stress research and capacity strengthening activities. While no specific donor commitments have been identified at this stage (apart from the World Bank), some

donors have indicated their intention to support this CP, commencing in 2003. Most current donors require firm project proposals prior to making commitments. The iSC notes that a strategy has been developed to “market” certain aspects of the CP to different donors, which is reasonable.

While the iSC is confident that donors will see the tremendous value of this programme to the CGIAR and find appropriate areas of research they are willing to support, it hopes that this will not come at the expense of Centre core crop improvement programmes that are vital for continuously providing improved germplasm to the NARS breeding programmes and, ultimately, to the farmers themselves.

The iSC Commentary of the Global Challenge Programme on Water and Food

1 Summary

The iSC strongly endorses this Challenge Programme and recommends it to the ExCo for further consideration by the Group. The Programme certainly responds to the CGIAR goals but also to a major global concern as reflected in the international arena. Consequently, the scale and scope of the Programme are ambitious by past CGIAR standards, but well justified. The iSC is confident that the proponents and their partners have the necessary capacity to meet the challenges and objectives proposed, if the prerequisite effort is devoted to the programme. The 12 months inception phase proposed by the iSC and accepted by the proponents will be critical to getting it on the right track. During this phase, the programme will undertake the detailed planning needed at the target basin level and, at the same time identify *ex-ante* the opportunities for producing international public goods through work at the thematic level across basins.

The iSC believes that the main risk to the Programme, and indeed to the existing CGIAR core programmes and Systemwide Programme on water management, is posed by the envisaged new funding not materializing at the required minimum level in the long-term. Success also hinges centrally on the ability of the programme to mobilize and organize activity at the Basin level and then develop the mechanisms for cross basin comparative analysis. This will require a concentrated and concerted effort and a great deal of skill in people management. The iSC is confident that the above two challenges will be met and that the Programme's prospects for meeting its objectives are high. The very promising initial funding commitments are encouraging.

Research on water and food is vitally important for the future of humanity and the planet, and the CGIAR can make an important contribution through its research. This Challenge Programme proposes to launch a very ambitious research, extension and capacity building programme aimed at increasing the productivity of water used for agriculture. It offers a broad research and delivery framework that would be used to define the precise researchable questions in target benchmark basins. The Programmes' interlocking goals are to allow more food to be produced with the same amount of water that is used in agriculture today, as population expand over the coming 20 years. And, do this in a way that decreases malnourishment and rural poverty, improves people's health and maintain environmental sustainability.

After several interactions with the proponents, the iSC is of the opinion that there are compelling arguments that the large scale and pervasive global water problems require a commensurate response from the CGIAR to organize a sustained global research effort that would not only elevate the game but mobilize the required additional financial and research resources. The iSC foresees such a role for the CGIAR Centres to become more prominent in the future, as envisaged in the Plank 7 of the new CGIAR vision and strategy which calls for the CGIAR Centres to play the role of a catalyst and a research broker. The iSC agrees that the proposal offers a relevant research framework that is very much in line with the iSC's suggested framework last year, and believes that the time is right for launching an international programme on water and food, as agriculture is the primary user of fresh water and an improvement of water productivity in the agricultural sector is needed to meet future

food demands and to contribute to alleviating water scarcity in many world regions. The iSC commends the proponents for their foresight and courage in developing a CP of the dimensions and ambition of this proposal via an effective multi-stakeholder planning process. It is equally impressed with the leadership that managed to involve a very large and diverse group of stakeholders that covers most, if not all world regions.

The proposed framework for research and development comprises a matrix of five themes and initially six large river basins, increasing to 12. The five themes are designed to cover the wide range of knowledge needed to improve water productivity for all activities in individual and diverse benchmark river basins in developing regions. The basins chosen contain a large proportion of poor population, facing water shortages and multi-scale challenges: of water resources management and development, of sector level water allocation; and of scheme and field level water productivity challenges, all of which have a bearing on future livelihoods, water, land and income security, and environmental quality. The cross-cutting focus of research and development on selected river basins seeks to ensure that research effort can contribute to the sorts of integrated solutions that society requires. The matrix of themes and river basins also provides a view of how many potential players might be assembled and coordinated to make effective contributions in the production of international public goods. Studies within themes across river basins will provide new knowledge, technologies and tools; work across themes within river basins will provide the integration needed to establish solutions and the principles for extrapolation to other basins.

Themes groupings are designed to ensure that the science is of the highest quality and linked to global issues; basin groupings are to ensure that research and development is grounded in the reality of existing real world problems. The iSC believes that the research questions delineated in the proposed framework should be sharpened at the outset, which the proponents agreed to do. The proponents also agreed to explicitly incorporate a priority setting process to meet planning and resource allocation needs to respond to unforeseen contingencies and risks. Similarly, the proponents accepted to incorporate changes suggested by the iSC to address issues concerning potential overlaps and to clearly delineate the linkages with other CGIAR programmes, the SWIM II: Comprehensive Assessment of Water Management in Agriculture, and with the Dialogue on Water, Food and Environment.

The Programme will be managed by an 18-member Consortium (and a Steering Committee), composed of 5 CGIAR Centres with IWMI as the Leading Member, 6 NARES, 4 ARIs and 3 international NGOs. The Programme is proposing a minimum core budget of US\$ 82 million from the CGIAR for a first five year phase, a sum which it projects will attract a further US\$ 50 million in matching funds. Assuming that the first five years show sufficient progress, at least 10-15 years programme duration is proposed. Some 75% of the total programme funding is organized around a process for open, competitive grant financing – a formula designed to open the field to many new partners, and to allocate at least 33% of funding for each project to NARES.

While the iSC commends the proponents for introducing competitive grant financing, it insisted that the identification of priorities and research agenda for each selected basin should precede the call for competitive bids. To enable this to happen, the iSC proposed the inclusion of a 12-month inception phase to define in detail the basin level needs, research hypotheses and researchable questions, research priorities and balance among themes, research agenda, and outputs and delivery plan for products. Additionally, and equally important, the iSC called for the incorporation in the revised proposal of a priority setting

mechanism, and quality assurance, accountability and monitoring of progress via internal and external science quality control, and intellectual property management. The revised proposal has incorporated all of the issues described above.

Following is a detailed assessment of the proposal, based on the opinions of six external referees and of iSC members, including the suggestions made for the formulation of a revised version of the Challenge Programme.

2. Relevance and Quality

2.1 Relevance of Expected Outputs

- a. The proposed research programme aims at delivering outputs that very significantly enhance the objectives sought by the CGIAR, namely poverty reduction, food security, and sustainability of resource use.*

The proposed research programme meets this criterion. The intermediate objective is to maintain the level of global diversions of water at the level of the year 2000, while increasing food production, to achieve internationally adopted targets for decreasing malnourishment and rural poverty by the year 2015, particularly in rural and peri-urban areas river basins with low average incomes and high physical, economic or environmental water scarcity or water stress, with a specific focus on low-income groups within these areas. The immediate objectives of the programme are: 1. Food security for all at household level; 2. Poverty alleviation, through increased sustainable livelihoods in rural and peri-urban area; 3. Improved health, through better nutrition, lower agriculture-related pollution and reduced water-related diseases; 4. Environmental security through improved water quality as well as maintenance of water related ecosystems services, including biodiversity. Both the intermediate and immediate objectives are relevant at the overall goal level.

The five research themes are: (1) crop water productivity improvement; (2) multiple use of upper catchments; (3) aquatic ecosystems and fisheries; (4) integrated basin water management systems; (5) global and national food and water system. These aim to ensure that the same core of key research topics is addressed in all locations across benchmark basins which provide the geographic focus for addressing the water problems and issues. The programme proposal offers a list of research areas under each theme and expects to organize about 75% of the total programme funding around a process of open, competitive grant financing. Because the scale of the proposal is so large, it is difficult to identify a clear set of deliverables and a research plan as to how they will be achieved, for example, using competitive bidding to achieve specific products. Also, the internationally adopted targets in the intermediate objective are not quantified and disaggregated to show the potential contribution of each of the selected basins to these targets that would result from the programme.

In this programme proposal, research relevance in terms of needs and research quality in terms of researchable questions, research methodology and expected outputs can only be defined clearly on a basin-specific basis. Only brief, but useful, information is provided regarding the basin-specific problems and needs. Basin profiles contain statements of the water issues that need to be addressed by proposed research but these have not fully reflected in terms of research hypotheses in the proposal. The proposed framework based on five

research themes has much in common with that outlined by TAC in its paper on “Water and the CGIAR” (SDR/TAC:IAR/01/24 Rev.1). The river basin focus is the mechanism to keep the theme research on track and responding to real world problems. The proposal touches upon surveys and benchmarking of user groups and consultations etc. A good amount of planning activity has gone on within the theme groups, giving valuable exposure to the groups within the themes. More detailed assessments of research themes in each basin need to be made during the proposed inception phase of 12 months, when specific research sites and topics within each basin will be identified at different scales commensurate with the research proposed. At that time, it will be possible to conduct a more detailed analysis of the quality and relevance of research outputs.

b. The proposal shows evidence of consistency with research priorities established by regional research organizations.

Given that water allocation, water productivity and water quality and environmental management are all of global importance, the proposed programme is consistent with regional priorities in a broad sense. Also, there appears to be an overall harmony between the basin-level interests and those proposed by the Programme as reflected by the fact that NARS representatives have participated in the programme design, and basin coordinators are from the participating national programmes. However, congruence with regional priorities is expected to increase as further detailed basin-level consultations, involving national and regional stakeholders, take place during the inception phase.

c. The expected results can uniquely be obtained through a Challenge Programme as opposed to the other CGIAR research channels, namely Systemwide Programmes and Center Core research.

A Challenge Programme is expected to greatly add value to ongoing research that shows promise of producing international public goods that can be further adapted and delivered to resolve problems that would make a significant difference to the lives of a large number of poor people over large geographical areas. The proposed Programme attempts to do this through a broad research conceptual framework targeted on basin-level problems and issues in response to the global scale water problems in densely populated river basins involving multi-dimensional opportunities and constraints to future development. The iSC believes that scale and breadth of the global water challenge requires a Challenge Programme that is commensurate in effort, capacity and resources from the global research and development community. This Programme offers a programmatic paradigm shift in the CGIAR envisaged in the currently ongoing reform process in the CGIAR.

d. The expected outputs are clearly defined and are achievable within the proposed time frame and budget.

Descriptions of expected results and outputs from the five research themes will be further defined during the inception phase to provide a sound basis for defining project outputs and the indicators to be used to measure progress. A limited number or subset of development baseline indicators in the benchmark basins, called target indicators, will be selected to measure progress within approved timeframes and budgets.

2.2 Quality of science and qualifications of the research team

- a. The research hypotheses are clearly specified in relation to the proposed challenge, and the proposed research methodology is directly relevant to the outputs sought.*

Research hypotheses in relation to the proposed challenge and the exact research methodologies will be specified during the inception phase when it will become clear what the priority research questions are in each basin. The basins selected are extremely diverse, and some are so large and internally so heterogeneous, e.g., the Indus-Gangetic and the Nile, that unless the details of specific intra-basin resource and land use characteristics, geo-demographic water problems and issues, and productivity change and development targets are specified, it is not possible to identify what research is required and for what purpose and for which intermediate and ultimate beneficiaries. This is a key item needed in the formulation of research priorities during the inception phase, and the proponents need to identify, at a realistic and workable scale, the research sites or areas where the multidisciplinary teams will conduct their research and the specific scientific issues to be tackled. The demographic, water resource use and management, and development needs across the selected basins are widely different and will need to be reflected in the research treatment and cost structure of the proposed Programme. Thus, while the programme does not fully meet this criterion at this time, the iSC is confident that right framework is in place to specify the research hypotheses based on the priorities identified for each region and across regions.

- b. The research is based on state of the arts knowledge in the domain, and the proposal explicitly places itself relative to the most recent advances in the field.*

The research proposed is based on state of the arts knowledge in water and the Programme displays an appreciation of recent advances in the scientific domain of each activity, provided by some very powerful research partners, including the CGIAR centres. It also incorporates the most relevant issues of the various water-related global agendas. There was considerable discussion with the proponents regarding the make-up within themes and the relationship between themes. The initial details presented to the iSC revealed a certain level of imbalance and gaps, and also overlap that arise because of basin level specificity of the water challenges that must be addressed. For example, Theme 1 emphasizes almost exclusively the biophysical aspects neglecting the social and institutional aspects, also largely overlooked in Theme 3. These later aspects are stressed much better in Theme 2. The proponents agreed to expand sociological research on collective action and other social issues in Themes 1 and 3, by internalizing these aspects in their own research under these Themes, and also by coordinating their efforts with the CAPRi Programme of the CGIAR. Although Theme 5 emphasises global issues, it had much to contribute to integration at the basin level in Theme 4.

The Programme must avoid the danger of a too-large commitment to plant breeding in Theme 1, particularly as the potential benefits of the new molecular thrusts for breeding for drought resistance remain distant. While the programme can justify some activity here, a real question is how much more it can draw from elsewhere, including the proposed linkage with the CP on Genetic Resources. The proponents have agreed with this iSC conclusion and agreed to adjust the involvement in breeding and work more closely with, for example, the genetic resources CP and breeders in the CGIAR.

c. The research itself is likely to lead to important advances in science and knowledge.

Research proposed is likely to lead to advances in science and knowledge. It is reasonable to expect that work of skilled specialists at each level will lead to important scientific advances but more importantly successful integration within the programme will also provide advances in tools and understanding required to solve problems at the level of implementation. However, caution must be expressed on the challenge of coordination and integration of the large group of scientists with extensive geographic dispersion. Any programme that seeks to involve so many scientists and institutions must accept the substantial transaction costs even where care has been paid to governance arrangements. The problem is made more serious because few scientists will be full-time on the programme and so will themselves suffer additional conflict of responsibilities. The programme must pay careful attention to the management challenge involved, perhaps developing some form of hierarchical matrix management and coordination.

d. The core parties in the programme are the best qualified in terms of research expertise and prior research achievements to carry on the research and deliver the benefits.

The core parties are well qualified in terms of past achievements to undertake the research. There is a very broad range of institutions and groups, going from very basic research to development activities in the field. This would be beneficial to the Programme, as it will provide a wide range of interests and of contrasting visions but it is also a challenge to Programme Management. The theme leaders are drawn from the CGIAR Centres while the basin coordinators are NARES scientists and engineers. In summary, the combination of IARCs, NARES and NGOs provide a continuum to identify the critical research issues and undertake research, integrate results, and communicate solutions.

3. Strategy for utilizing and applying results

a. The research proposal is accompanied by an explicit plan for delivery, communication, and dissemination of results and outputs, to maximize benefits to CGIAR stakeholders.

The proposal includes a plan for delivery of results and outputs by working through NARES and NGOs within river basins, development of decision support tools, and funds for conferences and publications at various levels. Close interaction is envisaged with the Dialogue and the Comprehensive Assessment, two activities already ongoing which are coordinated by IWMI. The specific intermediate and ultimate clients will be defined during the inception phase when it would be possible to judge how the proposed plan will maximize benefits to stakeholders and ultimate beneficiaries.

In discussions with the proponents, it was pointed out by the iSC that the Programme would be expected to produce international public goods, both global and regional. It saw a role for Theme 5 in identifying *ex-ante* opportunities for IPGs so that its analytical research is proactive, and its findings can contribute to research planning and management during the life of the Programme.

- b. The research proposal addresses not only the fundamental scientific aspects but also the applied and adaptive stages of the research, in a realistic manner, and the uptake of research outputs in order to produce high impact outcomes.*

A major strength of the Programme is that the research framework addresses high priority themes and sub-themes at a strategic level while the basin specific research work targets the science at the applied and adaptive levels. The background planning work to define the thematic research priorities will be further developed during the inception phase when basin specific products and impact pathways can be defined linked to coalitions for adaptive research and dissemination of results to beneficiaries. The involvement of river basin authorities at the technical and policy level will provide a basis for maximizing impact at various operating scales.

4. Collaborative arrangements and beneficiaries involvement in research

- a. The CP involves at least 2 CGIAR Centers and at least 2 NARS from the South. In addition other institutions from the North and South are slated to handle specific programme components or projects; CPs should involve the best institutions from the North and the South that can contribute to solving the problem. The institutions from the North should preferably bring their own resources to the consortium.*

The proposal combines activities and commitments from 18 Institutions (5 CGIAR Centres, six NARES, 3 NGOs, and 4 ARIs). There is a balance of institutions from North and South and the opportunity to enlist activities from more, especially ARIs, as the Programme develops. It is reasonable to be confident that the advantages of collaboration within the Programme to contribute knowledge within a framework that has the structure to solve these important problems of water productivity and sustainability will also attract other collaborating scientists. Again, it should be stressed that the programme has brought together a wide, diverse and representative group of partners. In fact, the breadth and number of participants is so great as to pose a major coordination challenge to the managers of the CP.

- b. The proposal gives clear evidence that consultations have been held with proposed research partners, in particular in the regions of relevance. The synergies, value added and mutual benefits among partners are clear.*

The proposal that has emerged reflects extensive collaboration and interaction with international and regional institutions (200 researchers from 50 institutions in 50 countries). The structure defines roles for individual partners, identifies where synergies exist, and will contribute to operation of the project. The planning process that has been established will also be beneficial at the basin level in future consultations to identify specific water problems, what research requires to be done and who can benefit from the proposed research and how. As pointed out in the proposal, the CP also is closely linked to the broader Dialogue and to the Comprehensive Assessment.

- c. *If competitive grants are to be used, procedures under which this would be done are clearly explained.*

A large fraction of the funds will be spent on competitively bid-for grants. This is an excellent method of finding new scientific ideas, encouraging ageing scientists to remain innovative, leading to a more effective and productive Programme that will be welcomed by the scientific community. It amounts to 75% of the programme budget, and at least 33% of funding for each project will be allocated to NARES. There is a reasoned distinction between projects that will receive complete or partial funding. The process and timing is clear. For all this to work effectively, research priorities driving each theme will be identified prior to putting out the call for bids so that bidders can target them with their proposals. The outcome would then be a set of linked projects that support each other in achieving a designated goal. The projects would have a clearly defined set of deliverables and a research plan as to how they will be achieved. The competitive bidding can be used to achieve and deliver specific research products. The use of anonymous, independent referees will be critical for the success of the competitive grants programme.

- d. *Participatory research, use of beneficiaries' knowledge and experience, and beneficiaries' interest in and ownership of the research subject are outlined and pursued by the CP starting with the planning stage.*

This aspect is outlined and under implementation with the basin level consultations and planning with all the stakeholders is scheduled during the inception phase to ensure relevance and local ownership of the research activities. The proponents are well aware of this need, and a CAPRI researcher will facilitate the development of collective action activities in the basins.

5. Governance and budget

5.1 Governance and management

- a. *Governance and management arrangements are defined explicitly in the joint venture agreement and in the Business Plan. They are flexible and adaptable to the specific needs of the CP and the structures are appropriate to the size and nature of the programme.*

The venture structure is impressive. The overall responsibility for top-level strategy and management lies with the CP Consortium Steering Committee. There are two critical issues in the CP management. The first is how good, strong decisions can be reached in the upper levels of the system. The second is how successful relations can operate at the lower levels. The first point is dealt with in the Business Plan. The CGIAR has overall authority, but this seems to be expressed more through review rather than continuing management. Responsibility for the latter rests with the CP Consortium, effected through the CP Consortium Steering Committee. This Committee consists of 18 members, one from each member of the Consortium, and it seems possible that this number may increase. The Committee will meet on a 6monthly basis. This makes the job of the Committee Chair exceedingly important. The Chair is the representative of the Leading Member of the Consortium, IWMI. The iSC commends the Leading Member for its achievements in developing and closing successfully an excellent legal agreement that highlights the presence and the contributions of the CGIAR Centres.

At the next level, the Leading Member of the Consortium nominates a CP Co-ordinator who reports to the Steering Committee. The Coordinator also leads the CP Management Team, with Lead Researchers and Basin Coordinators which will meet every three months. The Team has to manage a matrix with perhaps 50 or more cells in it, each of which will be a separate research programme with various projects, spread over a large fraction of the tropical parts of the world. The assurance of proper control and integration across this system seems to be the most difficult issue in the whole system. Wherever there is tension or disagreement between Lead Researchers and Basin Coordinators the CP Coordinator is the only person who can adjudicate. This person has a tough and thankless task in running the whole Programme, and he needs all the authority and backing he can get in order to carry it out. Serious consideration should be given to making him a non-voting member of the Steering Committee. The Chair of the Steering Committee must also be easily available for consultation and guidance on what is likely to be acceptable to the Steering Committee. The Chair should have responsibility for dealing with disagreements between members of the Consortium on the conduct of the research or the allocation of funds, to avoid the Coordinator being put in an impossible situation.

The management of the matrix between themes and basins is critical to the success of the whole Programme. CGIAR Centres have had much experience of management of matrices, but these are not always successful, and in particular, that it is difficult to get an even balance between the two dimensions of the matrix. In general scientists tend to look to one person as their leader and supporter, and the matrix works best where one dimension is clearly more important than the other. In this case the senior dimension will be the themes that are led by scientists with international status and experience, and so will contain most of the scientific planning and management. There is a danger that the Basin dimension will be seen simply as a service operation, thus damaging the potential programme achievements.

The maintenance of workable and efficient arrangements for 18 core institutions and other anticipated research partners will be a major challenge. Elements that would be important to address this challenge were seen to be: (i) The mechanism by which CGIAR will maintain oversight and reviews of the programme; (ii) while the present scheme stresses coordination and consensus, leadership will be critical to overall direction, emphases, integration, and adjustment to progress and circumstances; and (iii) to ensure that the researchers who devise themes or basin agendas do not get too close to project selection so that an adequate degree of separation is maintained between those responsible for the achievement of overall goals of the programme and those who should be consumed with the success of individual projects.

b. The CP is to be coordinated by an “independent” manager, operating on behalf of the core parties with clearly defined reporting responsibilities. The Coordinator is to be recruited from a core party or from outside, and appointed for a fixed term under the terms and conditions of an agreed core party.

An independent full time Coordinator has been appointed, and it is proposed that Theme and Basin Leaders should preferably be full time also. Full-time commitment seems essential as do clear arrangements for effective interaction.

c. The arrangements for administrative support (to be provided by one of the core parties) are satisfactory. The Board of each core party is accountable for the input resources and delivery of agreed outputs of that core party.

The arrangements for administrative support appear satisfactory. IWMI is the Lead Member of the Programme and the budget shows that an allocation of \$5M for the Secretariat and associated activities. The Programme is expecting to enable the Consortium partners to mobilize resources in the order of \$150M, thus offering a favourable administrative to total programme cost ratio. The respective partner responsibilities and accountability for resources and delivery of outputs are clear. However, given the 'large size' of the Programme, the Consortium Management should ensure that excessive demands on IWMI's administrative services are minimized.

- d. *There are clear lines of accountability and clear institutional arrangements spelling out roles, responsibilities, rules of operation, and conflict resolution in a formal agreement signed off at the appropriate legal level by each core party or CP associate party.*

The venture Agreement appears to consider all important aspects of accountability, and legal responsibilities between collaborating institutions has been legally accepted by all institutions. The iSC commends the proponents for this achievement of transparency at the outset as it provides a strong basis for trust building and goodwill for conflict avoidance or resolution and reconciliation.

- f. *There are clear and satisfactory arrangements for handling legal responsibilities and there is full adherence to the CGIAR's IPR policy.*

It will be very important to describe and catalogue IP assets created by the Programme, and to track the IP inputs provided by various institutions and partners. During the inception phase an IP asset management plan for the Programme will be developed. CAS will be contracted to provide IP asset management services to the Programme. The iSC commends the Proponents for their sensitivity to the need for IP management, and the approach adopted could be emulated in all Challenge Programmes and other similar research coalitions in the CGIAR.

5.2 Performance evaluation and impact analysis

- a. *Internal peer review mechanisms for quality and relevance and for performance evaluation are present and sound.*

The competitive bid system for grants and the peer review process managed by the Consortium management appear adequate to serve as quality assurance mechanism. External and independent evaluators will be contracted to review concept notes, and remunerated accordingly. Potential evaluators, without any conflict of interest, will be identified through databases held by the SC, the CGIAR Centres and the Consortium partners.

The deployment of eminent research advisors for the Programme in information management and GIS, hydrology, ecology and the social sciences will contribute to the Programme relevance and quality and credibility. The advisors would be involved in reviewing project proposals in addition to other project-specific independent external reviewers.

- b. Procedures are in place for the continuing monitoring of progress and adjustments of the programme (as needed) in the course of implementation.*

The arrangements for monitoring the progress of the programme, as opposed to the individual projects, need attention. The iSC has suggested that a priority setting mechanism be established early on to guide the identification of priorities and resource allocation, and also manage contingencies and risks that may have programmatic implications. In addition, the iSC expects that project planning will follow a log-frame approach and that the multi-year operational planning will be in harmony with the CGIAR MTP and external review processes. The iSC strongly recommends that the Science Council appoints an external advisory panel to exercise the scientific oversight and programme monitoring on behalf of the Group. Such need is also probably necessary in other Challenge Programmes, but it appears critical in this one, given the multiplicity of research topics, scales, and geographic areas of work.

- c. Indicators are identified and benchmark information is available to measure project impact.*

During the inception phase, the mechanisms to measure progress in both themes and basins will be put in place. For the basins, this will necessitate the development of a list of indicators for impact assessment. Baseline indicators will then be measured and monitored in each basin, or where necessary the capacity will be built to enable the baseline monitoring to be done. A smaller subset of the baseline indicators, called target indicators, will then be used in order to measure progress in the benchmark basins.

- d. The CP proposal should include an internal time-bound work plan on the project's progress, specifying stages and milestones, with intermediary deliverable products subject to independent peer reviews.*

The schedule provided for work plan, milestones, and deliverables for review is generally appropriate. The external advisory panel would provide oversight and monitor progress. A full scale work plan for projects will emerge during the inception phase. The project log-frames will provide the basic information on products and milestones, all of which will be monitored through internal as well as external evaluation processes.

5.3 Budget and finance

- a. The business plan outlines a strategy to mobilize new resources (in cash and in kind), considering equity in the relation between benefits and costs of the programme, and the need to balance contributions between North and South.*

The budget is developed on average costs per theme and basin which the Proponents admit clearly is too crude at this stage. The proposal states that actual budgets will be produced based on actual work plans. However, there appears to be some confusion as to what is the exact number of basins to be selected for the first phase costing US\$ 82.25 million, whether 6 or 10.

The arrangements have the capacity to mobilize new resources to the programme. These will be in the form of matching money for individual projects and also a reasonably expected full contribution from collaborating projects from ARIs. There is, however, a need to ensure

that the combination of the Dialogue, the Comprehensive Assessment and the CP do not confuse donors. The proposal should explain the mechanism by which a clear and workable distinction between these programmes that is consistent with maintaining donor interest and involvement will be kept.

b. The proposed budget and its allocation are appropriate;

Given the requirements of the complex structure and distributed activity proposed, distribution of the budget is appropriate to the challenge to maximize the proportion of the budget for research while ensuring adequate funds for synthesis, output and capacity building. Within line items, care would be needed with the US\$ 22 million allocated to working groups (themes and basins) to ensure that the minimum is spent on meetings. Savings anywhere could be well spent on research and capacity building.

c. Preliminary contacts confirm that there is sufficient donor willingness to commit funding for the first 2-3 years of the programme.

The iSC commends the proponent for having achieved a substantial funding commitment for the CP from a major donor (US\$ 25 million from The Netherlands), and most importantly, that it is not directly linked to the traditional CGIAR funding. Such contribution represents almost 30% of the anticipated total budget and is critical for the successful launching of this Challenge Programme.

ANNEX I: iSC GUIDELINES TO CP PROPONENTS IN PHASE III OF THE PILOT PROCESS¹

Phase III: Development of Full Proposals in the Pilot Process

The following are guidelines proposed by iSC for the development into Full Proposals of the three Pre-proposals selected by the Executive Committee for the CP Pilot Process. (Guidelines for the CP regular phase will be proposed at a later date, in particular to accommodate a broader range of submissions, including regional CPs.)

The programme proposal, including a business plan, should not exceed 50 pages in length, excluding appendices. The suggested general outline is as follows

1. Project summary (not to exceed two page).
2. Table of contents.
3. Project description and business plan.
4. References cited.
5. Budget; current and pending support.
6. Biographical sketches of main participants (Appendix).
7. Facilities, equipment, and other resources (Appendix).

The quality of the proposal will be assessed on the basis of the following criteria:

A. Relevance and Quality

1. Relevance of the expected outputs

- a. The proposed research programme aims at delivering outputs that very significantly enhance the objectives sought by the CGIAR, namely poverty reduction, food security, and sustainability of resource use.
- b. The proposal shows evidence of consistency with research priorities established by regional research organizations.
- c. The expected results can uniquely be obtained through a Challenge Programme as opposed to the other CGIAR research channels, namely Systemwide Programmes and Center Core research.
- d. The expected outputs are clearly defined and are achievable within the proposed time frame and budget.

2. Quality of science and qualifications of the research team

- a. The research hypotheses are clearly specified in relation to the proposed challenge, and the proposed research methodology is directly relevant to the outputs sought.
- b. The research is based on state of the arts knowledge in the domain, and the proposal explicitly places itself relative to the most recent advances in the field.
- c. The research itself is likely to lead to important advances in science and knowledge.

¹ Guidelines prepared by the interim Science Council during iSC/TAC 82 at CIP, Lima, Peru, 12 April 2002, based on the 8 set of criteria approved at the AGM'01.

- d. The core parties in the programme are the best qualified in terms of research expertise and prior research achievements to carry on the research and deliver the benefits.

3. Strategy for utilizing and applying results

- a. The research proposal is accompanied by an explicit plan for delivery, communication, and dissemination of results and outputs, to maximize benefits to CGIAR stakeholders.
- b. The research proposal addresses not only the fundamental scientific aspects but also the applied and adaptive stages of the research, in a realistic manner, and the uptake of research outputs in order to produce high impact outcomes.

4. Collaborative arrangements and beneficiaries involvement in research

- a. The CP involves at least 2 CGIAR Centers and at least 2 NARS from the South. In addition other institutions from the North and South are slated to handle specific programme components or projects; CPs should involve the best institutions from the North and the South that can contribute to solving the problem. The institutions from the North should preferably bring their own resources to the consortium.
- b. The proposal gives clear evidence that consultations have been held with proposed research partners, in particular in the regions of relevance. The synergies, value added and mutual benefits among partners are clear;
- c. If competitive grants are to be used, procedures under which this would be done are clearly explained.
- d. Participatory research, use of beneficiaries' knowledge and experiences, and beneficiaries' interest in and ownership of the research subject are outlined and pursued by the CP starting with the planning stage.

B. Governance and budget

1. Governance and management

- a. Governance and management arrangements are defined explicitly in the joint venture agreement and in the Business Plan. They are flexible and adaptable to the specific needs of the CP and the structures are appropriate to the size and nature of the programme.
- b. The CP is to be coordinated by an "independent" manager, operating on behalf of the core parties with clearly defined reporting responsibilities. The Coordinator is to be recruited from a core party or from outside, and appointed for a fixed term under the terms and conditions of an agreed core party.
- c. The arrangements for administrative support (to be provided by one of the core parties) are satisfactory. The Board of each core party is accountable for the input resources and delivery of agreed outputs of that core party.
- e. There are clear lines of accountability and clear institutional arrangements spelling out roles, responsibilities, rules of operation, and conflict resolution in a formal agreement signed off at the appropriate legal level by each core party or CP associate party.

- f. There are clear and satisfactory arrangements for handling legal responsibilities and there is full adherence to the CGIAR's IPR policy.

2. Performance evaluation and impact analysis

- a. Internal peer review mechanisms for quality and relevance and for performance evaluation are present and sound.
- b. Procedures are in place for the continuing monitoring of progress and adjustments of the programme (as needed) in the course of implementation.
- c. Indicators are identified and benchmark information is available to measure project impact.
- d. The CP proposal should include an internal time-bound work plan on the project's progress, specifying stages and milestones, with intermediary deliverable products subject to independent peer reviews.

3. Budget and finance

- a. The business plan outlines a strategy to mobilize new resources (in cash and in kind), considering equity in the relation between benefits and costs of the programme, and the need to balance contributions between North and South.
- b. The proposed budget and its allocation are appropriate;
- c. Preliminary contacts confirm that there is sufficient donor willingness to commit funding for the first 2-3 years of the programme.