

Symposium on Global Climate Change:  
Imperatives for Agricultural Research in the Asia-Pacific  
Plenary Session:  
Conference Recommendations and Action Plan  
Transcript

**Chairman Mr. Rajendra S. Pagoda, APAARI:** Now we can have our plenary session. Maybe we can have lights please, because it is necessary that we have representation of all the institutions, and major recommendations brought out to the house by the chair or co-chair, as they will have decided, but as you would appreciate have been very useful symposium over the last two days. In each of the sessions, many important issues have been flagged, and there are recommendations that need to be captured by us before we leave. In this respect, for the inaugural session, I would request Dr. Ghodake. Is Dr. Ghodake around? Dr. Ghodake, please, we need the recommendations of the inaugural session. Who is going to make the recommendations of the inaugural session? I thought that you might have decided among the three of you who is to do it. Rapporteur, Dr. Kamali? Would you kindly come forward and make your presentation on the podium please? Dr. Kamali is the deputy head of the Agricultural Research and Education Organization (AREO) of Iran.

**Dr. Muhammad Kamali:** Thank you very much. Mr. Chairman, ladies and gentlemen.

In my session, we had four key speakers, Dr. Martin Parry, with the title of "Implications of Climate Change for Agricultural Food Supply and Risk of Hunger." The main points of his speech were literature review, studies from 1994 to 2007, which evaluated the potential effects of climatic change on crop yield. He showed these studies covered three types of analysis in respect to socioeconomic conditions. And he concluded that climatic change will generally reduce the production potential and increase risk of hunger, and economical conditions have negative correlation and adverse effects on climatic change. Therefore, African countries are most adversely affected regions.

After that, Prof. Horie spoke about "Adaptation Opportunities to Global Climate Change in Agriculture in Asia-Pacific. He mentioned global climate change accompanied with greenhouse gas emissions have an enormous influence on agriculture between Asian countries. He discussed about the different effects of these phenomena on crop and livestock production, and increased pest disease and soil degradation. He also spoke about agricultural adaptability to the stressful conditions by genotyping improvement. The resource management is another measure to prevent the adverse effects of climatic change.

Prof. Rattan Lal discussed about change in soil preparation for cultivation by no tillage activity in farms and direct cultivation and reinhabitation and conservation by green and better management of soil preparation.

And finally, Prof. Wheeler spoke about the forecasting of possible change in crop productivity and crop distribution due to climatic in the future due to better management. He believed the experiments beat even tightly controlled differences in climate, like growth chamber is not enough entirely simulate all components of a changed climate. He proposed meta analysis of many of these studies can provide a broad consensus of impact of climate change by good analysis of data. It seems for short-term controlling effect of climatic change we have possibility to do something, but it is not for a long-term effect, and we must prevent how we can change our management conditions for providing the world with a lower effects of the CO<sub>2</sub> in agricultural conditions of the world, and it needs the collaboration and cooperation of our scientists and policymakers in our countries.

Thank you very much.

**Chairman:** Thank you Dr. Kamali. Maybe if there are any additional observations which have not been covered relating to this session and important messages, you are welcome to make it at this stage, please. Otherwise, he has tried to capture important points and now that we have decided that we will be having the proceedings of this particular symposium along with the recommendations brought out, so you will have highlights of each paper captured and presented, for which we have a resource person here, Dr. Aggarwal, who will be taking care of it. No comments? In that case, thank you Dr. Kamali, we appreciate it.

Then, for the Technical Session I, relating to research strategies at the national level—and kindly bear with us, we could not include all national status reports in the presentation due to paucity of time, but the main objective was to at least capture what is being done in the three sub regions of Asia Pacific South Asia, Southeast Asia and Pacific: We had these country reports, and I would request Raul to make the presentation.

Dr. Abd Shukor, the Chair of the session. Welcome Dr. Abd Shukor.

**Dr. Abd Shukor bin Abd Rahman, MARDI:** Thank you Mr. Chair, and Mr. Co-chair. Raul has flown back to the Philippines, but fortunately has left me this note to read the summary of the technical session.

The first technical session dealt with agricultural research priorities and strategies at a national level for adapting to climate change as well as mitigating climate change. In six countries, namely, Australia, India, Pakistan, Japan, the Philippines and Papua New Guinea. All of the presenters confirm that signs of climate change, such as increasing temperature, erratic rainfall patterns, and more frequent incidence of typhoons and droughts were already being felt in their respective countries. Special concerns were raised on the effects of such changes on pest and disease incidence, land use patterns, agricultural production and food supply, water availability, the socioeconomic conditions of farmers, trade, and other important factors which have also been deliberated and discussed today.

Research efforts on mitigation strategies focus on reducing greenhouse gas emissions, particularly from agriculture, promoting carbon sequestration, improving fertilizer, energy and input usage efficiency in the farms, developing biofuels, and preserving or rehabilitating watersheds. Adaptation measures, in turn, will address the physical, social, and economic impacts of climate change. These efforts should be complemented by conducive policies, regional cooperation, and effective monitoring and evaluation system, which was further deliberated and discussed in today's session.

I would like to highlight the major observations during the open forum from Q&A and answers being deliberated in session number one.

Firstly, we need to continue addressing the yield gap, even as we look for ways to mitigate the impact of climate change on farm yields. The two are not exclusive, since climate change can exacerbate the yield gap. At the same time, however, it should be recognized that the yield gap is much larger than anticipated declines in productivity that may arise due to climate change.

Secondly, the effect of deforestation and the potential benefits from reforestation programs and the accompanying policies need to be taken into full consideration in addressing climate change, even if these might not fall in direct purview of agricultural R&D.

Thirdly, inter-country collaboration on technology and varietal development for biofuel crops, such as jatropha, should be pursued in order to avoid costly duplication efforts. But I would like to also add here that jatropha is not conclusive enough in terms of R&D. There is a need to further enhance the R&D components of jatropha, as pointed out by the gentleman from ICRISAT. So, we need to look further into R&D on jatropha. However, we feel that this is possibly one of the ways in which we can possibly reduce the effect of using fossil fuels as a source of energy.

Fourthly, given that glacier melting and episodes of water scarcity will most probably be inevitable, R&D efforts should put particular emphasis on developing technologies to improve water use efficiency. Similar efforts should be devoted to maximizing the benefits from fertilizer usage, including analysis of policies and external factors to determine how much input farmers apply on their farms and how effectively they are able to maximize the additional value of the fertilizers that they apply on their farm.

Fifth, aside from developing economic responses to help agriculture cope with climate change or mitigate its effects, complementary initiatives should be pursued to develop effective social measures such as crop insurance that will help farmers and other stakeholders manage emerging risks and catastrophic climatic events.

Number six, which is the last recommendation, is that carbon trading provides an avenue for farmers to be compensated for their efforts to reduce greenhouse emissions and contribute to carbon sequestration. However, workable ways to aggregate the relatively minute contributions from small individual farms into economically sized and credible units will need to be developed.

Those are the recommendations that we have collected from the Q&A for Session 1, the technical session.

Thank you.

**Chairman:** Thank you, Dr. Abd Shukor, we appreciate you for capturing most of the important recommendations emerging from that session. Any additional comments or observations by the house? If not, then let us once again thank the chair, co-chair and rapporteur for their effort.

You all know because Mark was introduced to you, our co-chair, so I will now pass on to him, but maybe I did not have any opportunity to speak to the participants here in the symposium. I am executive secretary here of APAARI, and have been involved in the organization of this event in partnership with JIRCAS and our co-sponsors.

So Mark, now you take the rest of the presentations please.

**Co-chair Dr. Mark Holderness, GFAR, United Kingdom:** Thank you Raj. Certainly some very rich sessions. I would like to now turn our attention to the research strategies at the international level, which was the third session we dealt with. I am not sure who is reporting—is it Thierry or Anil Bawa? Please. Dr. Bawa from ICAR in India.

**Dr. Anil Bawa, ICAR, India:** Welcome everybody. Thank you Mr. Chair and Co-chair. I have the privilege to present before you the recommendations that have emerged from Technical Session II on Strategies at the International Level. This is the team: The chair was Thierry Mennesson, co-chaired by Simon Hearn, and of course the rapporteur was myself.

We had as many as eight speakers in this, from ARVDC, CIMMYT, ICARDA, ICRISAT, IRRI, IWMI, ICRAF, and CGIAR. We talked of many things; we talked of NRM, food security, sustainability, nutritional security, livelihood security, environmental sustainability vis-à-vis climate change. We had talks on rice, wheat, maize, millets, practically feeding the entire world. We were talking about water that is going to sustain agriculture, and we were talking about vegetables, which are going to be the kind of backbone for nutritional security in the years to come, and actually they have been.

If I go by the recommendations of each sections, we find the first one from AVRDC: We talked about screening germ plasm for biotic and abiotic tolerance or resistance, improving the nutrient and water use efficiencies, demand in the short-term, promoting good agriculture practices and crop diversification, processing, packaging, and transport and linking farmers to the markets, which is most important in the case of vegetables, since they are all very highly perishable.

CIMMYT: We talked about wheat and maize in this important session. Of course, the importance of wheat and maize in the present context or even in the past and future cannot be underestimated. It

feeds most of the world, practically. The first priority was pilot testing of stress-tolerant germplasm, crop improvement through targeted crosses, using the diversity spectrum and nitrogen management to curtail N<sub>2</sub>O emissions promoting conservation and so on, and of course the most important was to develop appropriate partnerships, whether in the government system or the private sector as the case may be, and to develop appropriate human resources to show the way forward.

ICARDA: Again, this is a very important area of agriculture, because most of the world still depends on rain-fed agriculture, and it is always under stress. In fact, I was involved in one of these places, and no year was the year when we never heard of some stress coming up and constraining agricultural production. The first one is going to be heat stress, whether on crops or livestock. Research is required on improving water conservation, productivity through multiple and diversified use of water, quality seeds which are central to any agricultural development, improving rangelands and grazing management. Rangelands, of course, always are put on a back seat, but their importance in ecological sustainability and also in the emerging areas and the concerns of climate change, these are going to be very, very important. A couple things that have been mentioned: we need to develop integrated crop/livestock rangeland system, and also put more conservation agriculture in ICARDA or the dryland areas. We need to also develop participative and gender-sensitive approaches and promote and encourage innovations in ARD. This was very clearly brought out by Dr. Maarten.

ICRISAT: In this, I would like to take a few points from the presentation. One is on the selective breeding for heat tolerance. Again, there are some similarities, quite a few similarities between ICARDA and ICRISAT areas. Breeding for abiotic stresses like heat, salinity, acidity, drought, etc. ICRISAT, as was brought out in the presentation, has already taken the lead, coping with the variability in the rainfall, which is a characteristic feature of the semi-arid tropics; you can never be sure about the precipitation, the rainfall, as to when and how much it will be there. Mapping out the development pathways and policy interventions to help the poor farmers in the cities. Plan for crop migration to warm/warmer areas; this is a concept which has been brought out in the light of increasing temperatures, which may necessitate that the present-day crops of the cities may be grown elsewhere, or look for some other appropriate niches. The ICRISAT has already put eleven projects; this is for the information. And of course, finally, public and private partnerships are needed to overcome the difficulties which are likely to be faced in agriculture.

IRRI: Rice, as we all know, is very important. Here also the priorities are for breeding for heat and stress, drought and submergence tolerance. Another priority was intensification of rice production with high resilience to extreme natural events and also for specific agro-ecological situations. High-yielding, low-emission rice production systems need to be developed, and of course these problems cannot be sorted out by a single institution; we need to have an interdisciplinary consortium at national and international levels.

IWMI: Water is again the most important resource for sustainability of agriculture. We need to conserve moisture and use moisture in a better way, considering that more and more competition is coming up for its use, and more and more water is being siphoned off toward urban areas, and the share of agriculture for water is going down. So, we need to be thinking more creatively about water storage and its use, increase water productivity. Quite a few speakers talked about it, whether it is economics or water use efficiency or water economics, yield per drop or productivity per drop, economic returns per drop we need to increase. Then, integrated use of soil and water management is very important; one cannot be seen in isolation from the other. Basic water management and allocation, and then of course early warning systems and insurance for water.

ICRAF: The recommendations for agro-forestry include generation of credible evidence of the carbon sequestration potential of different land management practices to combat land degradation, for which we may require conservation agriculture, forestry, and rangeland management. Support for national agriculture agencies for engaging in carbon markets, improving data on climate change impacts and their options, mainstream impact assessments and adaptations, development and resource-use planning; capacity building in agencies and the research role of agro-forestry in household waste management were some of the priorities that were highlighted in this presentation.

The recommendations from the Science Council of CGIAR: They were talking about the Challenge Program on Climate Change. The main objectives of the program are to reduce the critical gap in nexus of food security, livelihood and environment. Outcomes are to develop and evaluate the options to assist the farmers, policymakers, researchers, and donors to adjust their actions in the wake of climate change. Then, the target areas of the program are located in Asia, Africa, and Latin America. Work on anticipated temperature and precipitation change; current and predicted land use pressure, and different land tenure arrangements. The program seeks for active involvement of CGIAR and NARS, shedding the business as usual approach, some out-of-the-box or very proactive approach is required.

Then, I tried to found out some common points amongst all these presentations which the Chairman and Co-Chairman, considered to be overarching issues. This is what we have to say at the end of it. Because these were some of the common things that we found came up in most of the presentations from the consultative group institutions.

The pervasive role of climate change on future research objectives and priorities, commonalities of analyses, similarities of climate change and observations across CG centers, scope for greater inter-agency collaboration, challenge for future and regional global levels, the multidisciplinary nature of future climate research imperatives. Then to conduct all this, we need an enabling policy environment and suitable funding mechanisms for research and its adoption.

Thank you.

**Chairman:** Thank you very much

**Dr. Bawa:** If I missed out on some points, maybe we could add it right now.

**Dr. Holderness:** Please do. If there are other points from those in the audience who feel they have not been captured as well as you would like to see, please say now. Looks like everybody is happy. I would like to just raise a couple of further issues. One is that in your folders there is a paper that looks like this from the Director General of ILRI, the Livestock Research Institute, who sent his apologies that he could not be here. But please do read and digest that in your own time to add to this very full summary.

I just wanted to also get a little bit contentious for our international colleagues on two points. We have a change management process going on as you are aware with the CGIAR at the moment. One of the pushes is toward greater collective action, as Dr. Bawa has outlined here, and one of the initiatives that the Vice President of the World Bank, Kathy Sierra, flagged in Bali at the climate change meeting at the end of last year that was a new collective drive from the CGIAR towards action on climate change. Can I perhaps throw to the floor, what do you think are the top three elements that that initiative should now comprise from what you have heard over the last two days, and drawing on what has been said here? Any responses from you that we can start to articulate in a very focused way? Please.

**Dr. Reiner Wassmann, IRRI:** Well, one of the key ideas of this strategic initiative the way I see it is that it has to be complementary to other activities, and in particular to the Challenge Program. We had long discussions on what should form part of the challenge program and what should not. The outcome of those was some point, some way that the Challenge Program, the proposal then was conceived is that this should represent the common group of CGIAR on one side and broadly what we call the global climate change community, which is represented by the ESSP, the Earth Systems Science Partnership. So, by that definition, a number of key elements, key activities of the CGIAR which are related to climate change and which are important to climate change have been left out. For example, plant breeding is not part of the Challenge Program. We can argue about that, the pros and cons, but this is just the fact as it is. So the challenge program in itself can only be successful as long as there is real supportive action taken by the CGIAR systems to step up core activities in relation to climate change. So far, I think that whatever we are discussing what the strategic initiative should be about, it should actually complement the Challenge Program, and one of the first issues that comes to mind is really plant breeding. I think that is... The whole notion that the germplasm will just be there on the shelf to be used by the Challenge Program to adapt our cropping systems to cope with climate change is, I think, rather optimistic. Certainly we have to work also on developing germplasm. And having said that, there is really some lead time between the actual development and the product that will be available. So far, it is not just a question of to do something at some point; I think it has to start very early, and without that, the whole Challenge Program in itself is an effort that appears to be rather isolated. I think it is really important to start with these other activities rather sooner than later.

**Dr. Holderness:** Thank you. Do any of your colleagues want to just add to that briefly?

**Dr. Bawa:** I think that what I would like to say probably reinforces what Reiner just said. I think from an Asian perspective, over the past one and a half days, we have glossed over the fact that probably Asia is going to be one of the first regions that is going to be dramatically affected by climate change. That is going to be seen in the deltaic systems that dominate the region. I think that what we have not heard is really what is the impact of sea level rise, and how big an impact will it have on these grain baskets of the region? How many people will be displaced? And I think that this is, I feel for APAARI, probably a mantra that you can take up to really drive home the impact of climate change in these deltaic systems, and effectively map out a strategy—what are you going to do before these people, where are you going to take the lost production systems to? Because I do not believe that you can effectively breed yourself out of the problems that are going to occur due to sea level rise. Thank you.

**Dr. Holderness:** Thank you. That is a point very well made. And indeed, what is being asked of the international system into the future is to get much more strategic in just that sort of question, asking big questions that require collective action to deal with it. APAARI is indeed the vehicle through which that should be articulated. I am sure that Raj in particular will be following that through very actively.

We should now move to the next session, just in the interest of time. Thank you very much, Dr. Bawa.

The final session was on the panel discussion on adaptation and mitigation options, and where we go forward across this range of activities. Andrew, are you the rapporteur for this?

**Dr. Andrew D. Noble, IWMI:** Thank you Mark. I have tried to summarize what I think are probably five key points to come out of the panel discussion, which I thought was very stimulating and interesting, because effectively it did try to crystallize our thoughts on where do we go and how do we improve our profile within this whole debate on climate change. If I start off with number one, and I apologize if I may not have captured everyone's comments and thoughts, but I think there are probably five key points here.

I think that the first thing that we are all well aware of is that farmers are continually making decisions, and they are making decisions today and tomorrow. What is very important is that often these decisions are being made outside of the contextual environment in which we are working. I think there is a need to ensure that the research that we undertake actually does address and have relevance to the end user, which is the farmer. I think in that respect the term was raised that we should be viewing the farmer as a client, and we are effectively a service sector.

I think there was a second pertinent point, and that is effectively showing impact or success of our research endeavors. I think that this is very critical for us as a scientific community, that in order to effectively justify our existence, we do need to show that we do have relevance and impact. The agriculture research sector is certainly suffering a significant decline in what we term recruitment of



high-quality young scientists, and I think that again gets back to the fact that agriculture research has a very low profile. It does not have a very high level of community acceptance. Really, we need to change that, and there are all sorts of things that probably need to be addressed, but I think that number one is that if we can show that agriculture and agricultural research have relevance, we will effectively start to attract young and motivated people into the sector.

There is a need to enhance the profile of agriculture research and the importance of the sector in sustaining food production, and I think we are in a very good position right now. We have a food crisis or have had a food crisis, and I think that if we do not take advantage of that, I think we will be left in the dark once more. And that may be the role of APAARI, to take effectively a collective action for all the parties here in pushing forward the importance of agricultural research.

We did speak also about incentives, and how do we get farmers to adopt. The whole concept of carbon credits was raised and discussed, and the discussion of this whole process of developing mechanisms for essentially locking into some of these clean development processes, where there are payments being made for carbon sequestration. I think what really comes out of this whole discussion is that implementation of such mechanisms and approaches is not a trivial task or undertaking, and I think particularly when we are looking at small holding farmers and trying to effectively get some form of mechanism that will assist them in this whole process of carbon mitigation, is definitely a challenging endeavor.

My computer has now gone into sleep mode, hold on.

I think there was a fourth aspect that was related to—yes, Asia, and effectively developing a mechanism that is unique to Asia. We are thinking about Asia as being made up of a range of different communities at different levels of development, different populations. Here it is. There are limits associated with several of the global mechanisms such as the CDM with respect to inclusion of agricultural lands, and I think there was a good debate about that. This whole process of agricultural lands becoming beneficiaries of such a mechanism. Again, this brings into question the sector's ability to lobby and influence policy arenas. I think that here again it is important to think about how we can actually do that. Further, there is a need to develop initiatives, frameworks and mechanisms that are specific for Asia, based on its demographic distribution, economics, climate, and social imperatives.

I think the final one I have got is—"business as usual" is not an option in the way we go forward as scientists in the agricultural arena. There is definitely a need for advocacy and a single voice as a group, and I think it has been made quite clear that really this is an opportunity—the current food crisis—in which we can actually take action and enhance the profile of our discipline. And I think I am going to leave it at that.

**Dr. Holderness:** Thank you very much, an excellent summary from a very vigorous debate this afternoon. I would like to just also pick up on a couple of points you raised.

The role of APAARI to take collective action. I think that is a very critical one, and I am sure Raj would be happy to assume that mantle, to take this forward. I would like to also emphasize that collective action requires what it says on the tin; it requires everybody to be involved in addressing these issues. APAARI is the mechanism, but as I said earlier, it is down to all of you to make it happen at both the regional and the global scales.

I would like to also just throw across to Bala, if you do not mind, to respond to the issue on attracting young scientists to agriculture research.

**Dr. Bala Ramani:** Thanks very much Mark. I was pleasantly surprised and I am deeply grateful, because that point has come up very well, because I had some discussions with people after I raised the point, and the context that was falsely understood which I put the first time, but I am happy that it has come out. One thing which I certainly want to see is that after this program, after this thing, I have discussed with you and Dr. Paroda, and also with JIRCAS and other stakeholders, that we have to develop a program by which we have to see to that, developing networks and also make sure a kind of program is developed to make sure that this attitudinal change is brought out at a debate workshop by which form that we have to take in. We have to invite the regional stakeholder people together, sit on the board, and try to ask them what is the idea on the board to have this possible. And this is exactly as you said; it is an unfortunate crisis in food prices that brought all this debate. Probably this is also the time, we as professionals have to catch up the real point now, and with the help of the decision makers and other stakeholders we request, and we are on board. I make it here on record that we are on board, and we would like others to help us and support us that we take this forward. Thank you, Mark.

**Dr. Holderness:** Thank you indeed. Those of you not familiar with Bala's program, the Young Professionals in Agricultural Research and Development is a movement to literally mobilize young people to get more engaged in agriculture research and to really move this forward, so I think we should all support that certainly.

Just to wrap up from my side, I am very pleased by the summaries that we are hearing, because I think they are giving a very coherent view of what has come out of this meeting. We have to do some more distillation, crystallization, I think, out of this as well, because as someone was saying at the coffee break, "What do we tell the ministers when we go back to our countries? What has come out of this meeting?" And I think we really need to be focused on that, as to what are the key messages that we are coming home with. I think that certainly I will not steal Raj's thunder, but I think for the APAARI region, there will be some key issues that we should now be highlighting as a summary of our deliberations, so that we are not going away from this meeting to say, "That was an interesting meeting, wasn't it nice, and now we will go back to business as usual." We have to move this forward as a

collective action, we have to take this on. There are, as I mentioned yesterday, a number of key meetings coming up in the next few months. We need to be making representation into those to bring all of your voices forward and very clearly as to what is required from our perspectives as a collective voice. I was very pleased—I think it was Andrew who raised the issue of the delta regions, and the particular need there. Those are the sort of big impact questions that we should be asking now. I think what is particularly unique to the Asia Pacific region, where we need to look at climate change coherently, amongst us all, collectively, with farmers at the center of the process, and really make a change. I will pass to Raj now, for his summary from there. Thank you.

**Chairman:** Thank you Mark, for sharing this responsibility and making your concluding remarks. Now, as per program, the Chair has also to make some summary report.

First of all, on behalf of APAARI and also our co-organizer JIRCAS, I would like to thank you all who participated in this symposium over two days and accepted our invitation even on short notice. Your presence here today is indeed a reflection that you believe in partnership, at not only the national but regional and global level. No doubt we all are aware that Rio de Janeiro drew attention on sustainable agriculture, and then we met in Johannesburg to talk about sustainable development. Now, everyone is talking about inclusive development. IPCC has clearly drawn the attention of all leaders and scientists alike about climate change, that it is real, it is happening, and it needs to be addressed, and it needs to be addressed especially in those areas where the effect is going to be more severe.

In that context, Asia Pacific has to do something to see that we address the poverty that is still in terms of intensity, maximum. We should also see that livelihood is improved and is going to be affected adversely due to climate change effects, and we will take care of our environment, for not only ourselves, but for posterity. In that context, it very clearly came out that it could not be a singular approach, and both adaptation and mitigation have to be addressed at the local level as well as jointly. And for that, we need to look at the short-and long-term options that are available, both in the context of scientific options or technological options, and policy options.

So as was raised clearly, how do we catalyze policymakers to see that they support the activities and actions which can make a difference? Also, the other message that came clearly was that we must think globally, but act locally. I think the time is ripe that all national partners from the APAARI region who are present here—and I am glad that most of the national leaders are here, and I do not agree to this thinking that scientists and leaders at the national level cannot make a difference as far as policy implications are concerned. They do listen to us. I know about my scenario in India. But they need a very conclusive argument, and support to what you want. In that respect, we need to see that for the action at ground level, we start looking at the impact of available technologies and innovations. It was very clear, and I am personally very optimistic, that there are technological options available.

No doubt we need to do more, but whatever are available have to be put to use, and it was clearly said that putting knowledge to use and not having “business as usual” will be an important aspect to be addressed by the scientific community as a whole, whether these options relate to water, soil, genetic resources—all need to be looked at. This can be done if there is a national action plan. We need actually those who have are advanced and are moving forward. But we need to have national action plans for combating the effects of climate change. Those who have not, better start thinking about what kind of national action plan we have. I know in Pakistan this exercise is going on, from my discussion with Dr. Tusneem.

We have also clearly understood that problems relating to climate change cannot be confined to any geographic boundary or particular nation. It has to be interregional and global. And for that we have to come together. We cannot work in isolation. Today, scientifically, the world is a global village. That is how we are all meeting here and sharing our experiences, and I think we have learned a lot. And in that process it was very clearly brought out that you need not only interregional and global partnership; you definitely need besides south-south, north-south partnership, or partnership with advanced research institutions and international centers.

We also have understood that we need an interdisciplinary approach. This climate change cannot be addressed in a singular discipline approach. An interdisciplinary approach for minimizing the risk would require consortium, like a challenge program being put in place on climate change, and we should see this as an opportunity. But that is not the only option. We need to see where we can work together, bilaterally or multilaterally. In that respect, the involvement of regional fora beside advanced research institutions, of national systems and stakeholders in Asia and involvement of regional fora like APAARI would be very, very necessary. This has been a gap in the past, and we are happy that the Science Council is now being reorganized as the Science and Partnership Council. You need partnership; it is not only the science alone, and unless this partnership process is strengthened, possibly we will not be able to accomplish what we want. In that respect, it came out again very clearly that we need to refine our knowledge management on climate change and assessment scenario that is presently available. How correct it is in the context of each sub region or national aspect is to be looked at. And for that, it would definitely be desirable—if advanced organizations or systems like I saw here in Japan—JIRCAS, NARO, NIAES—could possibly think of having a center for agriculture research and information on global climate change to provide that leadership. That does not mean that they should not also establish like this. I was so happy in the presentation, Dr. Tusneem said that they have come out with a center on scientific knowledge on climate change, newly established. I think many countries and national programs will have to think whether they have an institutional mechanism to address this concept. If not, they will have to establish, and rather they do it better, sooner than later.

This message is well received, and we would urge our APAARI partner, JIRCAS, who is co-host, to kindly think of providing leadership, because they have resources, they have support, they have advanced technologies relating to knowledge management in the region to refine what is yet required to be done.

Other important points which came are with regard to catalyzing policymakers for more investment in R&D—or rather, I would say, research for development. For that, we need political support, and for that possibly we need to come out with some declaration from this meeting. I would say, if you all agree, we will put all these major recommendations in one or two pages, and call it the Tsukuba Declaration on Climate Change. If that is, I will put it to your approval at the end, but this is just a thought which has come to me, in which all of us should try to see what we can do, or at least flag the Tsukuba Declaration to all those who matter. Whether they give attention to it or not is a separate issue, including donors. Because donors are all the time talking about poverty, livelihood improvement and environment, and maximum concern, as was indicated, is going to be in the context of the maximum concentration of poor people in Asia Pacific. Why donors are not giving attention? No doubt Africa is also important, but when you look in terms of poverty concentration, Asia also has its own importance in terms of more donor support. We need to do more aggressively, and for this the message should go.

And, we are very happy that the World Bank report has clearly highlighted the importance of agriculture, agricultural research for development at the global level. If this is not done, the needed development that we are aiming at to meet the Millennium Development Goals will not be achieved. This is a very clear message which has come up front, and we are happy that agriculture, which was at one time given the back side, has been brought to the front. Therefore we see the role of global forum, CGIAR, at this stage, to flag this message, because the time is right to get more support for these kinds of efforts that we are aiming at.

In this context, we also have to see that we have the right talent to do what is needed, not only in terms of research, but also in terms of transfer of technology, and for adoption of technology. The young farmers are also not attracted to farming. I come from a farming family myself, and it is a major problem in villages. Everyone wants to go to urban areas. So this challenge of attracting young people to various roles in agriculture is important, and this also would require attention at the national level to have incentives proper for an enabling environment to see that this happens. It will not happen just by saying that we need young people.

Finally, I would like to say that on behalf of APAARI, we have identified this research rather, I would say, anticipated research priorities about three years ago, and along with biofuel and also along with risk management in agriculture, which are also related to some extent with climate change, like floods, drought, and temperature, etc. In that respect, we decided to have this expert consultation, and we are happy that JIRCAS came forward. Thanks to you, Dr. Iiyama, and your team, we have here 158 persons from 31 countries. 159, sorry; from Japan 94, and from overseas 65, from 31 countries, including Japan. I think it is highly satisfying in terms of what we have been able to accomplish. But the journey does not

end here. We need the road ahead. When you organize anything of this kind, expectations also go, and we need to do more, but no individual organization or institution can do it.

APAARI is yours, and we will try to move forward to see that these recommendations or the Tsukuba Declaration is brought to the notice of all those who matter at all levels, and for that we need your support and we will bring out the proceedings and recommendations. The organizers have assured us that they will provide you with a CD of all presentations. They will send it after compiling, and maybe after one week you will get those, along with the list of participants and the program. We would like to really place our appreciation for this to JIRCAS and their team.

I do not have any more to add at this stage. Maybe I have left still a few important points, but the recommendations would be collective, we will share with you electronically, and we would like to have your suggestion and input before they are printed and widely distributed. But the Tsukuba Declaration also will be sent to you for your input and your advice. We should have done it in advance, but this thought came only this afternoon, so I crave for your indulgence for not having accomplished this in time, but I do need your endorsement as to whether we should have this Tsukuba Declaration approved by the house this evening. Subject to your approval electronically, of course, because the document is not in your hands, but it will capture all the important points.

Do I presume silence is agreement?

**Multiple speakers:** Yes.

**Chairman:** So, let us have this. Well, colleagues, I think we have now concluded our session, hopefully in time. Mr. Co-chair, we are not all that bad, but there is a pleasant duty on behalf of APAARI, and for that matter I would request our chair of APAARI, Dr. Ghodake, to kindly come forward and acknowledge by presenting a small memento to important functionaries of JIRCAS. Let me tell you that we appreciate and we place on record the support provided by JIRCAS for organizing this meeting, and being so hospitable and putting almost a staff of 11, 12, 13 people working for the last two or three months with us. I also would like to thank this program, which you have witnessed, is an outcome of a working group having one representative from each of the co-sponsors, working with us and for GFAR, Mark; Maarten from ICARDA; Rodomiro from CIMMYT; Dr. Dino Keatinge from AVRDC; and then we have got Dr. Gowda from ICRISAT and Dr. Iiyama himself from JIRCAS and myself from APAARI, also supported by Pramod Aggarwal. This was a collective effort to put this program together, and we must thank all the speakers for having agreed to our invitation. No one declined our invitation. So that is our strength again.

With this, Dr. Ghodake, could you please present this token of our affection, first to Dr. Iiyama...

**Dr. Raghunath D. Ghodake (Chairman, APAARI):** I do not want to repeat what Dr. Paroda has said, but I think on behalf of our Chair of APAARI, as well as the Executive Committee and everybody in

APAARI, I think I would like to extend our sincere thanks and gratitude to everybody, including Dr. Iiyama, his colleagues, the Government of Japan, all those people who were involved who were mentioned by Dr. Paroda, that we are grateful to all of you. This was really a success in terms of what we achieved in two days' time. I think it was much beyond our expectations, so thank you once again to all of you.

**Chairman:** Could I request now Dr. Senboku, the Vice President of JIRCAS, who had originally offered to host this meeting in our 9th General Assembly at ICRISAT in 2006? Welcome, Dr. Senboku, and thank you.

Next, I would request the important key player for all logistics. Under his leadership, and the head of the International Cooperation Division of JIRCAS, Dr. Osamu Koyama. Dr. Koyama, please.

Next is Dr. Noda, Takahito Noda. Is he around? He had been helping us from the background all the time.

Then, next is Tamao Hatta. Not here? We will pass on them later.

Then to Elvira Suto. She had been very active, attentive and pointing out all of the mistakes every time. Thank you. Thank you Elvira for all your support, and to your group, we will acknowledge them separately.

Finally, I would like to say that we place on record, financial support, without which it would have not been possible to meet here. So beside JIRCAS, AVRDC, to CIMMYT, to ICARDA, to ICRISAT, and to GFAR for bringing all these experts and key national partners here. I would be failing, Mr. Chairman, to you, to thank the APAARI Secretariat also, in that we have Saha. Where is Saha? Can you just stand? Saha? Our Liaison Officer in Bangkok, and Uairat, our Administrative and Poonam. This is only a small APAARI Secretariat. Our Chair and Co-Chair, Dr. Abd Shukor.

With this, I would like to say we are grateful, and thank you very much for participating. But I give the last word to Dr. Iiyama to say something.

**Dr. Kenji Iiyama, President, JIRCAS:** Thank you very much to all of the participants to this symposium. So, we got lots of fruitful output from this symposium. Dr. Paroda has requested to establish a research center for the agricultural research and information for global climate change. We accept that proposal, and then we will, of course, at that center cooperate with the APAARI office. In Japan, we have lots of scientists for the climate exchange, so we need to discuss with NARO and NIAES scientists who are also involved here at this symposium. As soon as possible, we will set up some mailing systems for the registered people, scientists, to send information and exchange knowledge, and also to set up the homepage through the JIRCAS homepage for that center.

Also, again, to all of the participants from overseas, thank you very much for coming here. I hope you will go back to your countries safely, and continue further research for global exchange and agricultural research. Thank you very much.

**Chairman:** Thank you. And thank you to the Co-chairs, and those who have been all the time playing and announcing—it is Simul International, so I would like to thank them also. Thank you very much.