

South and West Asia

Principal Regional Coordinator
Dr John Dixon



India

Key statistics	
GDP per capita (US\$)	1,061
Population (millions)	1,177
Funding	
	\$m
2008–09 actual	2.79
2009–10 budget allocation	2.97
2010–11 budget estimate	3.19

Medium-term strategy

The emphasis of the India–Australia collaborative research partnerships in the main wheat-growing areas has evolved from maintaining the sustainability of wheat-based cropping systems to improving productivity, through development of new varieties resistant to major biotic and abiotic stresses. The application of marker-assisted selection to achieve greater efficiencies in wheat breeding will be a primary research tool. A complementary research area is the enhancement of cropping system productivity in relation to wheat (as well as brassica and soybean). Work along these lines commenced in 2008, co-funded by the Indian Council for Agricultural Research.

In the less-favoured areas of India's rainfed central plateau, broad-scale land and water resource management is being addressed, augmenting the earlier technical focus with complementary research on cropping systems, and institutional and policy issues related to water management. Technical, economic and policy research approaches to increase water productivity will have an increasing focus on climate change issues. Project design emphasises strengthened integration, greater involvement of farmers and NGOs, and engagement with policymakers, with a view to achieving quicker impact.

Policy analysis research at national and state levels is shifting from stand-alone policy projects to integration of policy components into the above research areas. This will include research into domestic agricultural policy and trade-related reform options.

Position

India faces very significant problems in its rural sector, even as the overall economy forges ahead. Indeed, the greatest number (approximately 300 million) of poor and undernourished people in any country is found in India, and most live in rural areas. At the same time India



Indian farmers in Uttar Pradesh watching Dr Richard Richards (CSIRO) inspect their wheat harvest (Photo: Felicity Muller)

faces trade liberalisation and rapid diversification of diets towards high-value agricultural products.

ACIAR's collaborative program in India has evolved into four focused subprograms within the context of Australia's Development Cooperation Framework for South and West Asia. These derive from consultations on agricultural research priorities and the key research themes through which the two countries can achieve synergies. The Government of India is also encouraging donors to work with NGOs and independent research organisations. Partnerships with NGOs will help increase emphasis on achieving practical farmer-level impacts, particularly in poorer regions. Involvement of independent policy institutions and their linkages to central and state government departments will also increase the likelihood of policy impacts.

India has a large and well-developed national agricultural research system. The Indian Council for Agricultural Research has several major programs, including the World Bank-funded National Agriculture Innovation Programme and the US–India Agriculture Knowledge Initiative, both of which share similar research priorities with the ACIAR program. ACIAR will maximise collaboration both in areas of Australian expertise and in areas where both India and Australia have strong common interests and potential for field-level and trade impacts in both countries. ACIAR will engage predominantly with researchers in the main wheat-growing states (Punjab, Haryana, Madhya Pradesh and Uttar Pradesh) and the Indian central plateau (Andhra Pradesh, with outreach to Karnataka, Maharashtra and West Bengal). Projects will help India manage scarce water and nutrient resources more efficiently, improve

yield and quality of cereal and oilseed crops, diversify production and raise farm incomes. Rainfed cropping systems in central and eastern India are prone to the effects of seasonal climate variability and, in the long term, impacts of climate change. India is one of four partner countries involved in ACIAR's climate change adaptation initiative.

A number of IARCs are also active in India. ICRISAT, with headquarters in Hyderabad, has strong programs on peanut, sorghum, millet and chickpea, as well as crop–livestock systems (with International Livestock Research Institute (ILRI)) and soil management in the semi-arid tropics. The International Maize and Wheat Improvement Center (CIMMYT) and IRRI have significant regional activities in India, many connected with the rice–wheat eco-regional initiative. The International Water Management Institute (IWMI) has a joint program on policy issues with an Indian research institute, as well as other biophysical programs in India. ACIAR supports projects with these IARCs.

Research priorities

ACIAR has a program of consultation with India to establish priorities in research collaboration, most recently between July 2006 and May 2007. These priorities are evolving through periodic discussions with key partners and stakeholders in India (see also Box 4). The current research program is clustered around the following focal areas:

Subprogram 1: Application of marker-assisted selection as a tool in wheat breeding (Indo–Australian program on marker-assisted wheat breeding)

- » Application of marker-assisted selection to provide varieties with improved leaf, stripe and stem-rust resistances
- » Identification and application of suitable traits and markers for coping with abiotic stresses
- » Identification and application of wheat quality traits

Subprogram 2: Cropping systems productivity enhancement

- » Identification of new traits in oilseed brassicas
- » Improved rice establishment methods for direct seeding, including better weed management
- » Nutrient management in wheat–soybean cropping systems

Box 4. New initiatives in an evolving research partnership

A decision has been taken by ACIAR to expand the Indian program over a 4-year period starting in July 2010. The expansion will be focused in two major areas: first, advanced food crop breeding methods underpinned by bioinformatics, in order to consolidate existing innovative activities and potentially to expand to additional crops; and second, the extension and expansion of the water management projects currently clustered in Andhra Pradesh.

Subprogram 3: Water management and productivity for enhanced livelihoods in rainfed areas of the central plateau, with emphasis on Andhra Pradesh

- » Implementation of sustainable water harvesting and watershed development
- » Informing of water resource management and policymaking to optimise water productivity
- » Improvement in water productivity of rainfed cropping and livestock systems
- » Adaptation of farming systems to cope with climate change

Subprogram 4: Policy options for trade and market reform to underpin agribusiness development

- » Adjustment to the challenges and opportunities of international trade
- » Facilitation of private-sector investment in agribusiness and marketing
- » Safeguarding of smallholder livelihoods in the transition from a regulated to a market economy

Current project portfolio

(Possible new projects commencing in 2010–11 shown as 'proposed'.)

Subprogram 1: Application of marker-assisted selection as a tool in wheat breeding

Wheat is the major crop of both India and Australia and is grown in similar environmental conditions in both countries. Although farm size is very different in the two countries, there are many similar production constraints.



An Indian wheat farmer inspecting his crop

The north-west is India's major grain-growing area, and continued productivity is central to farmer livelihood and food security considerations. Until recently the ACIAR focus in this program has been to underpin the broader sustainability of wheat-based cropping. This has comprised a cluster of projects addressing a range of soil and water management and productivity issues involving improved nutrient management and zero tillage. It has been complemented by a set of projects revolving around the development of improved wheat varieties that can cope with biophysical soil constraints such as waterlogging and soil sodicity/salinity.

Following a joint review of priorities in 2006–07, it was agreed to strengthen the focus on the application of marker-assisted selection as a tool to achieve greater efficiencies in wheat breeding. This new subprogram shares costs and benefits between the partner countries. It recognises advanced research capabilities in both countries, as well as the central and catalytic role of the active project 'Molecular marker technologies for faster wheat breeding in India' in the process.

CIM/2003/067 (*multilateral*) Ensuring productivity and food security through sustainable control of yellow rust of wheat in Asia (CIMMYT)

CIM/2005/020 Molecular marker technologies for faster wheat breeding in India

CIM/2006/071 Indo–Australian project on root and establishment traits for greater water-use efficiency in wheat

CIM/2006/094 Enhancing farm profitability in north-western India and South Australia by improving grain quality of wheat

CIM/2006/177 Wheat improvement for waterlogging, salinity and element toxicities in Australia and India

CIM/2007/083 (*proposed*) Applying molecular markers to breeding wheat with enhanced processing properties in India and Australia

CIM/2007/084 Molecular markers for broadening the genetic base of stem-rust resistance genes effective against strain Ug99

Subprogram 2: Cropping systems productivity enhancement

CIM/1999/072 Oilseed brassica improvement in China, India and Australia

CSE/2004/033 Zero-tillage rice establishment and crop weed dynamics in rice and wheat cropping systems in India and Australia

CSE/2006/124 Finetuning the Happy Seeder technology for adoption in north-western India

LWR/2002/032 Integrated manure nutrient management in soybean–wheat cropping systems on vertisols in Madhya Pradesh and Queensland

Subprogram 3: Water management and productivity for enhanced livelihoods in the rainfed areas of the central plateau, with emphasis on Andhra Pradesh

Better water management is one of the highest priorities for improving livelihoods in the more-marginal rainfed areas of central India. Water harvesting, as part of a broader watershed development agenda to increase water availability, is a key policy initiative of the Indian Government in these areas. While primarily designed to increase water productivity of crop and livestock production systems at both farm and watershed levels, widespread implementation of watershed development harbours risks of unintended hydrologic and socioeconomic impacts downstream, potentially risking some of the gains achieved in upstream areas.

Furthermore, water resources in rainfed areas are subject to some of the problems associated with common property, for example weak water institutions and the lack of clear water rights and entitlements. This poses a challenge to program design, as addressing the above issues requires a systems approach spanning both spatial and temporal scales and the integration of biophysical and socioeconomic disciplines. Hence, this subprogram comprises a cluster of closely linked projects to enable a more holistic approach to water resource management.

Given similar water constraints and policy challenges in many parts of Australia, including the semi-arid tropics, there is significant expertise in Australia to address water research issues from policy to crop-water productivity.

CIM/2007/120 (*multilateral*) Improving post-rainy sorghum varieties to meet the growing grain and fodder demand in India (ICRISAT)

FIS/2002/001 Developing aquaculture in degraded inland areas in India and Australia

FIS/2006/144 Strengthening regional mechanisms to maximise benefits to smallholder shrimp farmer groups adopting better management practices

LWR/2002/100 Water harvesting and better farming systems for benefit of small farmers in watersheds in the East India Plateau

LWR/2006/072 Impacts of watershed development on upstream and downstream hydrologic response and economic benefits

LWR/2006/158 Enhancing institutional performance in water resource development in Andhra Pradesh, India

LWR/2007/113 (*proposed*) Adaptation of water resource management to climate change in the Krishna Basin, India

LWR/2008/019 Building capacity of farming communities in Cambodia, Lao PDR, Bangladesh and India to adapt to climate change

Subprogram 4: Policy options for trade and market reform to underpin agribusiness development

Creating the right policy environment for reform in the agricultural sector has the potential to deliver major impacts. Australia has significant expertise in policy analysis, particularly in assisting India with the implications of its transition from a highly regulated economy to a more-open market economy. Large private retailers in India are poised to make large investments in the supply side to expand the already considerable agribusiness-input supply sector, after having consolidated the retail sector. There is potential for enhanced Australian participation in the Indian food production chain through, for example, investment, collaboration and partnerships with Indian businesses, or export of Australian products and services. Possible benefits to Australia resulting from market reform include a capacity for India to engage in more-open trade relations.

ADP/2007/062 Facilitating agricultural sector reforms in India: an assessment of regulatory and competition policy requirements

CSE/2006/132 Policy instruments to address air pollution issues in agriculture—implications for Happy Seeder technology adoption in India

Key performance indicators (2010–11)

- » Dissemination of applicable genetic information for quality and phenology in Indian wheat-breeding programs
- » Identification of weed management strategies for direct seeded rice in the rice–wheat farming system
- » Improved understanding of the impact of climate change on water resources in the Krishna Basin
- » Provision of evidence-based policy options on competition and market reform for the Indian agricultural economy

Key program managers

Dr John Dixon, Cropping Systems and Economics

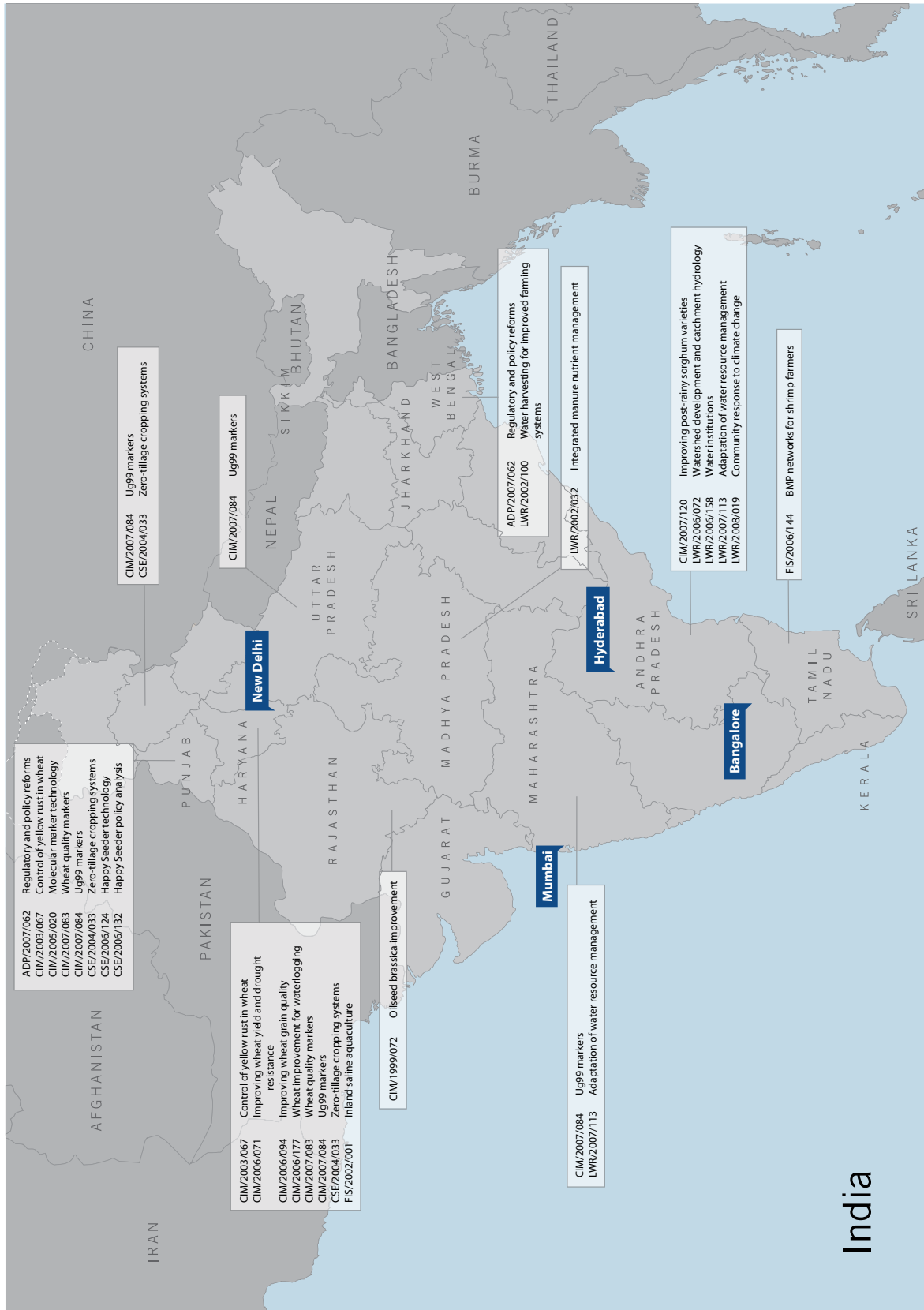
Dr Paul Fox, Crop Improvement and Management

Dr Simon Hearn, Agricultural Development Policy

Dr Mirko Stauffacher, Land and Water Resources

Country manager

Dr Kuhu Chatterjee



Bangladesh

Key statistics	
GDP per capita (US\$)	494
Population (millions)	162
Funding	
2008–09 actual	1.04
2009–10 budget allocation	1.53
2010–11 budget estimate	1.07

Medium-term strategy

ACIAR's focus in Bangladesh is grain crops. Projects complement national programs and activities of the CGIAR. The past emphasis on 'Rabi' or winter season crops such as pulses, wheat and maize will shift towards a farming systems approach supporting broader food security issues. The components on rice-based farming systems will expand and include research on adaptation to climate change.

Position

Bangladesh has been a partner country since the mid 1990s. ACIAR's program in Bangladesh is quite small, with projects focusing on constraints to broadacre crop production (especially the rice–wheat system) and the potential for increasing legume production in cropping systems. This past focus will broaden with the emergence of rice–maize as an increasingly important cropping system. Increased pulse productivity and availability will lessen nutritional problems associated with the dominance of rice in diets.

With re-emerging concerns about Bangladesh's ability to maintain food security in the light of its high vulnerability to the impacts of climate change, the emphasis will shift to increasing the productivity of rice as the main staple. Low-lying areas and rainfed cropping systems in Bangladesh are particularly impacted by the effects of seasonal climate variability and climate change. Consequently, Bangladesh is one of four partner countries involved in ACIAR's climate change adaptation initiative.

Research priorities

Priorities for collaboration are developed through meetings of ACIAR research program managers and other senior staff with managers and scientists at agricultural R&D institutions and government bodies in Bangladesh. Current collaboration is mainly in the

production and management of grain crops. In the medium term ACIAR will address the area of agronomic and biotic constraints to broadacre grain production, and will continue to consult with Bangladeshi partners on priorities for climate change adaptation research with impact at the farm level.

Current project portfolio

(Possible new projects commencing in 2010–11 shown as 'proposed')

ASEM/2009/039 (*proposed*) Policy research, workshops and program coordination (Mekong–South Asia Food Security Research Program: component 6)

CIM/2003/067 (*multilateral*) Ensuring productivity and food security through sustainable control of yellow rust of wheat in Asia (CIMMYT)

CIM/2007/122 (*multilateral*) Sustainable intensification of rice–maize production systems in Bangladesh (IRRI/ CIMMYT)

LWR/2005/001 (*multilateral*) Addressing constraints to pulses in cereal-based cropping systems, with particular reference to poverty alleviation in north-western Bangladesh

LWR/2005/146 (*multilateral*) Expanding the area for Rabi-season cropping in southern Bangladesh

LWR/2008/019 (*proposed*) Building capacity of farming communities in Cambodia, Lao PDR, Bangladesh and India to adapt to climate change

Key performance indicators (2010–11)

- » New food security emphasis achieved through research on farm production intensification with incorporation of pulses
- » Increased ability to enhance food security demonstrated through an improved understanding of cropping and water management adaptive capacity in rice-based farming systems at the local level

Key program managers

Dr John Dixon, Cropping Systems and Economics

Dr Paul Fox, Crop Improvement and Management

Dr Mirko Stauffacher, Land and Water Resources

Country manager

Dr Kuhu Chatterjee

Pakistan

Key statistics	
GDP per capita (US\$)	1,010
Population (millions)	168
Funding	
2008–09 actual	\$m 1.96
2009–10 budget allocation	1.02
2009–10 budget estimate	2.39

Medium-term strategy

ACIAR's long-term focus in Pakistan is on linkages within the horticulture and dairy sectors and on natural resources management issues such as efficient water use, salinity management and tillage options for irrigated cereal cropping. ACIAR collaborates closely with AusAID, notably in relation to the Australia–Pakistan Agriculture Sector Linkages Program (ASLP), which ACIAR is implementing on behalf of AusAID (see below).

Australia–Pakistan Agriculture Sector Linkages Program (ASLP)

A second phase of the ASLP is due to commence in early 2010–11. The overall goal of phase 2 is collaboration to improve livelihood systems for the rural poor in Pakistan. ASLP 2 is now a major strategic engagement under the Pakistan Australia Agriculture and Rural Support Strategy (PAARDS), the Australian whole-of-government strategy for rural engagement with Pakistan.

The main goals of ASLP 2 are to:

- » foster value chains through commissioned research and development projects that enhance selected chains and benefit the rural poor through market and employment opportunities, addressing both technical and social issues to foster suitable outcomes
- » enhance agricultural capability through 'smart linkages' and structured training that is responsive and catalytic, and complements the key initiatives supported under pro-poor value chains and other work
- » encourage facilitation of well-grounded policy, codes of practice, or other operational frameworks or regulatory mechanisms that will 'enable' pro-poor value chains and more sustainable farming systems.

This ASLP extension will initially concentrate on the mango, citrus and dairy sectors, but with a greater focus on: gaining benefit for small and poor farmers and other

disadvantaged groups; greater involvement of women; dissemination of results; and maximising project impacts. Flexibility will be built into the ASLP extension so that it can provide a mechanism for addressing additional sectors as well as agricultural R&D issues and enhanced capacity building.

Position

Pakistan has been an ACIAR partner country since 1984. Increasing pressure on availability of water resources for irrigation exists due to competing demands from urban and industrial uses. Soil and water salinity and drainage problems are placing additional pressure on irrigated agriculture. Given the similarity of some of its own water resource and salinity issues, Australia is well placed to assist Pakistan in addressing these issues. ACIAR's program continues to focus on irrigation, drainage and salinity management in the major cropping systems.

In addition, there is recognition that Australia has skills for working with some of Pakistan's key horticultural crops, especially citrus and mangoes, the two most important tree crops. Australian expertise can provide a whole-of-system approach to increase the productivity and competitiveness of the mango and citrus industries, encompassing all steps from fruiting to market. Pakistan is also one of the world's largest milk producers, with slightly less than half of that production being from dairy cattle. Unit animal production is very low although genetic potential is quite good. Major opportunities exist for applying Australian expertise in animal nutrition and integrating forage production into farming systems to assist in improving milk production. This work is a key to poverty reduction, particularly for some of Pakistan's landless people. The geographic focus in ACIAR's Pakistan program, including work carried out under the support of the ASLP, is on Punjab, Sindh and North-West Frontier provinces.

Research priorities

The most recent formal consultations were held in November 2008 during the review of the ASLP, which confirmed the importance of continuing research on dairy and efficient mango and citrus value chains. All continuing projects in Pakistan will include significant components of capacity building in participatory research and extension methodologies.



A research group meeting with local farmers in an orchard in Pakistan (Photo: Les Baxter)

Indicative priorities are grouped under the following themes:

Subprogram 1: Developing more-productive and competitive mango and citrus production and marketing systems

- » Diagnosis and control of diseases, especially dieback in mango
- » Orchard management to increase productivity and reduce input costs
- » Optimisation of supply chains to increase value-adding and marketing opportunities
- » Support of linkages between farmers and the private agribusiness sector
- » Analysis of policies underpinning development of the horticultural sector

Subprogram 2: Improving livelihoods of dairy farmers

- » Increase in unit productivity of dairy cattle through improved nutrition
- » Support of linkages between farmers and the private agribusiness sector
- » Analysis of policies underpinning development of the dairy sector

Subprogram 3: Management of land and water resources to sustain productive enterprises

- » Introduction of strategies to optimise the value of limited and variable-quality irrigation water
- » Technology selection to improve productivity of saline land and water resources
- » Use of resource-conserving technologies for irrigated horticultural and cereal-based farming systems



Cauliflowers for sale at a market in Pakistan

Current project portfolio

(Possible new projects commencing in 2010–11 shown as 'proposed'.)

Subprogram 1: Developing more-productive and competitive mango and citrus production and marketing systems

The horticulture sector in Pakistan is significant, both domestically and for export production. A problem common to both mango and citrus is major losses due to poor harvesting practices, packing and transportation. With production, key issues are inadequate orchard and irrigation/drainage management, and major diseases. Australia has strengths in mangoes and citrus that span the production system and supply chain, in particular the use of a systems approach and integration of end users in the planning, execution and evaluation of the research. These are unique attributes that could be employed in Pakistan, and promise significant opportunities for impacts on productivity and more-efficient supply-chain systems. The ASLP will aim to capitalise on this by linking the Australian and Pakistan research teams with the agribusiness sector and introducing participatory activities with farmers.

HORT/2010/001 (*proposed*) Mango value chain development in Pakistan—ASLP phase 2

HORT/2010/002 (*proposed*) The enhancement of citrus production in Pakistan and Australia through improved orchard management practices—ASLP phase 2

HORT/2010/003 (*proposed*) Underpinning social research for collaborative development—ASLP phase 2

HORT/2010/006 (*proposed*) Integrated crop management practices to increase sustainable yield and quality of mangoes in Pakistan and Australia—ASLP phase 2

Subprogram 2: Improving livelihoods of dairy farmers

Dairy is the largest livestock sector in Pakistan, with demand for milk and milk products growing at about 8% per year. Despite good genetic potential among animals, production is low due to poor nutrition, mismanagement, failure to control diseases and lack of proper marketing of this highly perishable commodity. This is compounded by a fragmented research effort and weak extension support services. The ASLP will support Government of Pakistan initiatives to stimulate the dairy sector. The program will integrate activities and concentrate on mechanisms to increase individual animal production, principally through nutrition. It will have a strong systems focus and an emphasis on capacity building in extension strategies. The issues likely to be considered in this approach include social, economic and biophysical analysis of farming systems, development of seasonal feeding options, the introduction and evaluation of forages, and feed conservation strategies.

LPS/2010/007 (*proposed*) Improving dairy production in Pakistan through improved extension services—ASLP phase 2

Subprogram 3: Management of land and water resources to sustain productive enterprises

Irrigated land supplies more than 90% of agricultural production in Pakistan. The main canal system and its secondary canals are managed at a provincial level by central irrigation agencies. A recently introduced reform process is designed to shift the management of irrigation at local (tertiary) levels to water-user associations. The aim is to address some of the multiple problems of irrigation systems such as inequitable water distribution, high conveyance losses, low delivery efficiency, waterlogging and salinisation.

Box 5. Relationship to the Australian Development Cooperation Framework for Pakistan

A new Development Cooperation Framework for Pakistan is under development. In line with an increased focus on helping the Government of Pakistan get back on track to achieve the Millennium Development Goals, priority sectors for Australian support are primary education, basic health, natural resources management, agricultural extension and poverty reduction in selected areas of the country. The ACIAR program, while concentrating on the agricultural sector, includes a strong emphasis on reducing vulnerability and increasing productivity of the poor while fostering rural economic growth. The Pakistan program also addresses increased productivity through management of the natural resources base and value chains.

Increasing competition for water by non-agricultural users will put additional strain on the systems, and there are uncertainties about future water supply as a result of climate change. Australia, facing similar problems with its irrigation systems, has developed strong irrigation and water resources research expertise. In the future the cluster of projects in this subprogram is expected to have substantial linkages with the horticulture and dairy sectors, while improving the overall performance of the irrigation sector in Pakistan. There will also be ongoing support to promote raised-beds technology as a promising on-farm technique to reduce irrigation water usage.

CIM/2003/067 (*multilateral*) Ensuring productivity and food security through sustainable control of yellow rust in wheat in Asia (CIMMYT)

LWR/2002/034 Refinement and adoption of permanent raised-bed technology for the irrigated maize–wheat cropping system in Pakistan

LWR/2004/035 Technology for direct drilling into rice and other heavy stubbles in Pakistan and Australia

LWR/2005/144 Optimising canal and groundwater management to assist water-user associations in maximising crop productivity and managing salinisation in Pakistan and Australia

Key performance indicators (2010–11)

- » Commercial production of disease-free mango and citrus planting material with resistance to environmental stresses established, and distribution to growers commenced
- » Integrated crop management recommendations developed, and implementation commenced, for mango and citrus growers
- » Preliminary mango market R&D completed for at least one new export market
- » Best-practice demonstration value chain established for at least one existing export market
- » Feed base for smallholder dairy farmers optimised and profitable feeding strategies for calf rearing trialled in new regions of Punjab and Sindh

Key program managers

Mr Les Baxter, Horticulture

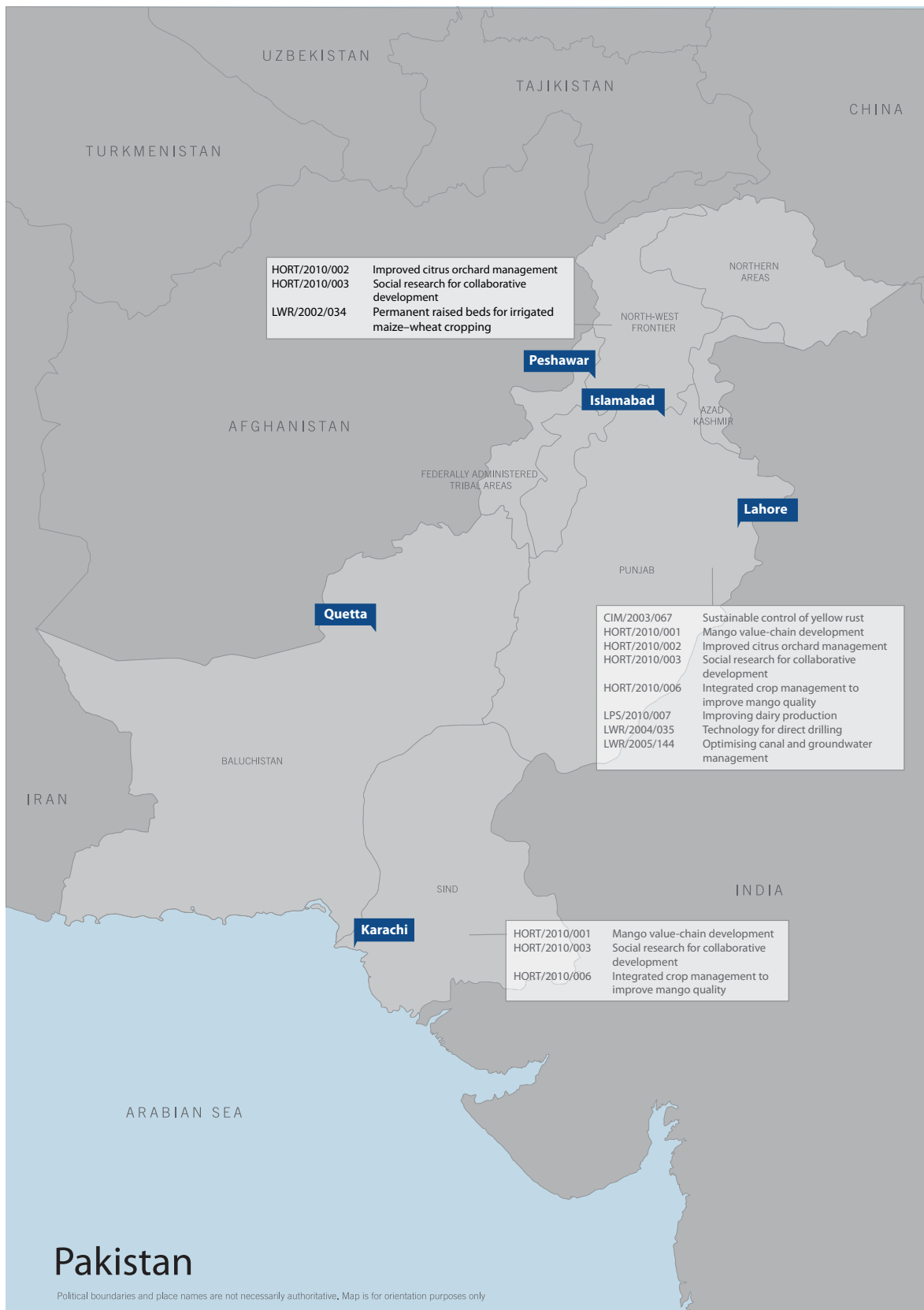
Dr Peter Horne, Livestock Production Systems

Dr Mirko Stauffacher, Land and Water Resources

Dr John Dixon, Cropping Systems and Economics

Country manager

Dr Kuhu Chatterjee



Iraq, Afghanistan and Bhutan

Key statistics	
GDP per capita (US\$)	
Bhutan	1,933
Afghanistan	466
Iraq	788
Population (millions)	
Bhutan	0.7
Afghanistan	28.0
Iraq	31.0
Funding	
	\$m
2008–09 actual	2.66
2009–10 budget allocation	3.40
2010–11 budget estimate	3.63

Medium-term strategy and priorities

ACIAR is managing one, and finalising the formulation of a second, large project in Iraq, both co-funded by AusAID. It is anticipated that support will be limited to these projects in the short term as Iraq passes through a critical period of consolidation following recent improvements in its security environment. Activity in Iraq and Afghanistan will continue through collaboration with CGIAR centres. CIMMYT and ICRISAT are leading the activities in Afghanistan, while the International Center for Agricultural Research in the Dry Areas (ICARDA) is the key partner in the ACIAR-supported project in Iraq. In Afghanistan and Iraq there are complex operating environments, resulting from poor security and political uncertainty, that limit access by Australian scientists and hinder donor capacity for long-term planning. In Bhutan there is one major active project, and a scoping study has been conducted to ascertain possibilities for an additional project.

Priorities are developed through visits by research program managers and other senior staff meeting with leading agricultural R&D institutions and government bodies. Efforts are also made to collaborate and coordinate with other implementing partners, including government, NGOs, grower and industry groups, and donor organisations.



*Project scientists Dr Abdulsattar and Dr Saad inspecting the zero-till seeder at Telkief, Ninevah, Iraq
(Photo: Colin Pigginn)*

Iraq

Iraqi scientists have had limited access to international developments in the agricultural sector for over two decades. Consistent with other support provided by the Australian Government, the ACIAR-managed and AusAID-funded projects are intended to facilitate the development of modern and sustainable agricultural production and marketing systems in Iraq.

In Iraq pressures to abandon cereal–fallow rotations have exacerbated soil degradation and nutrient depletion to the extent that established cropping systems are in serious decline. The introduction of sustainable tillage will play a key role in restoring these systems, and spillover benefits are also expected beyond Iraq. The project has been shaped by the relevance of Australian expertise to Iraqi conditions, but constrained by the inaccessibility of Iraq by Australian scientists. It focuses on the enhancement of barley, wheat and grain legume production under dryland conditions in northern Iraq through the introduction and evaluation of appropriate modern varieties; and on the adaptation of improved management practices, including tillage, fertiliser and weed control techniques. Achieving sustainable increase in domestic production is now a national imperative.

Significant yield improvements are anticipated, given that current yields of these crops are only about one-third of those under similar conditions in developed countries. Iraq's agricultural sector represents a vital component of its economy as it is the largest employer (25% of the labour force) and the second-largest industry after oil (as a contribution to GDP).



Mandarin farmers, who benefit from higher citrus productivity in Bhutan

The 2 million-hectare (ha) central-southern irrigated zone that produces vegetables, fruit and cereals is under increased pressure from salinity, which has long been identified as a major threat to agriculture in Iraq. Implementation of past policies aimed at improving irrigation and drainage practices have been hampered since the early 1980s because of political tensions with neighbouring countries. This has been compounded by increasing levels of salinity of irrigation water from both the Euphrates and Tigris rivers due to changed water regimes. These changes are the result of upstream damming of the rivers and subsidiaries in Syria, Turkey and Iran, but climate change and variability have also recently affected river flows. Consequently, Iraq's extensive irrigation infrastructure has been degraded and soil salinity has spread across much of the irrigated areas of central and southern Iraq. According to the Food and Agriculture Organization (FAO) of the United Nations, it is estimated that approximately 75% of this region is moderately saline and another 25% has levels of salinity that prevent farming.

Much work is currently being undertaken within Iraq to explore production gains from saline agronomy. However, it is recognised that this farm-scale work must be complemented with work at the basin and irrigation-district scales to provide a scope of the size of the problem. Broad strategic policy options can then be implemented to ensure that farm-scale change is made with a sustainable future assured.

These issues are particularly relevant within the Australian experience as they mirror the issues that

confronted managers in the Murray–Darling Basin in the late 1960s through to the mid 1980s (following the droughts of 1967 and 1983). The actions taken by Australian bureaucrats and researchers at both policy and strategic levels, as well as farming systems changes at the local level, are particularly relevant to the Iraqi situation.

ACIAR's proposed 2-year scoping project in Iraq focuses on understanding salinisation processes, water management and the use of moderately saline soil for agricultural production. The project is expected to be funded by AusAID, managed by ACIAR, and executed by ICARDA and Australian research organisations.

Afghanistan

Two decades of war coupled with a recent severe drought have devastated Afghanistan's food production capabilities and depleted critical seedstocks, leaving the nation heavily dependent on food aid from international donors. ACIAR's collaboration with Afghanistan, which started in 2002, provides support to wheat and maize production. Wheat is by far the most important crop, while maize is the third most important. Activities have aimed principally to import seed of suitable cultivars, establish on-farm participatory testing of imported germplasm for the identification of better adapted improved cultivars, and undertake local multiplication and distribution of selected cultivars. Particular attention is being paid to capacity building; improving rust resistance in wheat, with specific attention to the new stem race variant designated Ug99; and promoting

improved crop management, along with provision of improved cultivars of both wheat and maize. The gains made with cereal-based systems will be extended through a capacity-building initiative to assist Afghani counterparts to design and implement community-based watershed programs, and provide on-the-job and external training courses and MSc programs.

ACIAR is exploring future program options with the Ministry of Agriculture, Irrigation and Livestock; CGIAR partners; and AusAID around capacity building in watershed management. Community-based watershed development provides an entry point for transfer of many improved agricultural technologies and for cropping diversification. This watershed focus will also strengthen on-farm engagement through the current project (CIM/2007/065) for cereals, as well as further legume research linked to cereal-based systems, conservation agriculture, weed control, water-use efficiency of cropping systems, and higher value crops for sale to enhance farmers' livelihoods. ACIAR's project partners will work with in-country organisations who have established programs in agricultural extension and community development.

Bhutan

Because of Bhutan's relative lack of capacity to effect significant change across many agricultural sectors at once, the program will remain small and very tightly focused. Earlier ACIAR research to develop Newcastle disease vaccine for village chickens was extended and adapted for the situation in Bhutan with the help of AusAID funding, and projects have been initiated on the management of fruit flies and on footrot management in ruminants. A major initiative on improvement of citrus production (Bhutan's largest horticultural export industry) and pest and disease management is being implemented.



Afghan farmers in an improved wheat field

Current project portfolio

(Possible new projects commencing in 2010–11 shown as 'proposed'.)

Subprogram 1: Field crop germplasm improvement and utilisation

CIM/2003/067 (*multilateral*) Ensuring productivity and food security through sustainable control of yellow rust of wheat in Asia (India, Pakistan, Afghanistan, China) (CIMMYT)

CIM/2004/004 (*multilateral*) Plant genetic resource conservation, documentation and utilisation in Central Asia and the Caucasus (ICARDA)

CIM/2007/065 (*multilateral*) Sustainable wheat and maize production in Afghanistan (CIMMYT)

CIM/2008/027 (*multilateral*) Development of conservation cropping systems in the drylands of northern Iraq

CIM/2008/047 (*multilateral, proposed*) Cropping system diversification, capacity building and rural livelihoods in Afghanistan (ICRISAT)

Subprogram 2: Sustainable water resources management

LWR/2009/034 (*proposed*) Salinity in central and southern Iraq

Subprogram 3: Horticulture, including pest and disease management

HORT/2005/142 Improving mandarin production in Bhutan and Australia through the implementation of on-farm best-management practices

Key performance indicators (2010–11)

- » Research gaps related to watershed management in Afghanistan scoped and identified
- » Elite wheat lines with Ug99 stem-rust resistance identified for agroecological zones of Afghanistan
- » Effective characterisation of salinisation processes in central and southern Bhutan undertaken
- » Best practice integrated production management practices implemented by commercial citrus growers and smallholders

Key program managers

Dr Paul Fox, Crop Improvement and Management

Dr Mirko Stauffacher, Land and Water Resources

Dr Les Baxter, Horticulture

Country manager

Dr Kuhu Chatterjee