

CRP1.1 Research in Central Asia and the Caucasus – rationale and key research hypotheses

- 1) Central Asia and the Caucasus (Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan) occupy a land area of about 4.1 million square km, of which 14% is under arable and permanent crops. The Region is known for its vast area covered by deserts, mountains and steppes. About two-thirds are drylands with low rainfall. Climate is strongly continental and subject to extremes of cold winters and very hot dry summers. About 30% of the cultivated area is irrigated, and irrigated agriculture sustained livelihoods of the people in CAC for millennia.
- 2) In recent history, the eight CAC countries gained independence from the former Soviet Union 20 years ago. They adopted a new course towards market economy, with different models – and experiences – of socio-economic development. The state policy of each of the countries includes as a strategic goal food security associated with self-sufficiency in wheat production to secure the economic sovereignty. During the past ten years, overall productivity in wheat and other major crops increased in almost all countries as a result of innovations introduced in agriculture.
- 3) Agriculture employs between 20-50% of the population and farming is the primary source of income in rural areas, besides remittances. Growing and predominantly rural populations expect secure income options, stable and healthy food supply under the changing environmental and socio-economic conditions.
- 4) In addition to the necessary policy, technological and institutional factors in the CAC Region, in order to generate a dynamic development, including agricultural innovations systems, it is necessary that it becomes better connected to global markets as well as to most advanced education, research and innovation centers. Strong international trade and market access, development of science, and mutual cross-fertilization of ideas with other Regions of the world had been the basis for the prosperity and eminence in CAC s in the past.
- 5) Land degradation occurs widely and is associated with soil erosion, low soil fertility and high salinity of soils. In the lower Amudarya basin, the specific problems of waterlogging and salinity cover almost 90% of the area that is under irrigation. The yields of wheat, the main food crop, are very low due to the secondary salinization of the soils, caused by seepage losses from earthen canals, very low permeability of the sub-soils, poor natural drainage of excess water, and inadequate artificial drainage infrastructure. Over-irrigation leads to almost 50% of the water lost to either open drainage system or the shallow watertable.
- 6) Under these harsh conditions, the application of water-use efficient techniques and proper soil and crop management practices becomes essential. It is also necessary to use highly productive crop varieties that can be grown under local production systems, are tolerant to biotic and abiotic stress and meet market requirements of the local population. An enabling policy and institutional environment is key factor for their implementation.
- 7) The CRP1.1 sees it as its prime objective to study and provide options for reducing vulnerability and managing risk in the production systems characterized by land degradation, severe socio-economic conditions, health risks and no viable development alternatives. Two trans-boundary Action Sites meeting the conditions of Strategic Research Theme 2 (SRT-2 “Reducing vulnerability”) were identified, namely the Aral Sea Region and the Rasht Valley. They constitute the upper reaches of Amudarya river (Rasht Valley in

Tajikistan and to a small extent in Kyrgyzstan) and the lower reaches of both Amudarya and Syrdarya rivers (Aral Sea Region stretching from Turkmenistan through Uzbekistan to Kazakhstan).

- 8) The factors influencing an effective uptake of a given technology will be examined as part of the CRP1.1, and impacts established using quantitative analyses through randomized control trials.
- 9) Participatory approaches incorporating local knowledge into a given technology have demonstrated their effectiveness in previous research. Therefore, development and adoption of an innovative knowledge platform for integrated land conservation, watersheds management in upper and lower reaches of the Amudarya and the lower reaches of Syrdarya will lead to improved institutional functioning and responses in addressing agricultural constraints (for rangelands and irrigated agriculture) (Research Hypothesis 1).
- 10) Improved options and practices for integrated water and land resources management, increased diversity portfolio (including neglected and underutilized species) adapted to soil salinity in target cotton-wheat-rice-livestock production system will increase soil and environmental health, sustainable agriculture productivity, improve diets and food nutrition, and increase employment in the Aral Sea Region (Research Hypothesis 2).
- 11) Increased diversification of the mixed production system integrating horticulture, agro-forestry, value addition and market access will enhance water productivity, human nutrition and livelihood of rural women and men, thus increasing employment in Rasht Valley and in neighboring areas (Research Hypothesis 3).
- 12) In addition, a system analysis integrating bio-economic modeling for optimum scenarios will enable out-scaling for agro-pastoral and mixed most vulnerable production systems (Research Hypothesis 4).
- 13) The CRP1.1 will also seek most effective ways of improving the competitiveness of small production systems by sustainable intensification and by diversification to higher-value crops. In the process, it will seriously consider the opportunities for woman in these transitions. Fergana Valley was identified as the Action Site where most impact can be achieved in terms of sustainable intensification (SRT-3). It is a trans-boundary area between Kyrgyzstan, Tajikistan and Uzbekistan, characterized by environmental and socio-economic conditions that could lead to generating significant income for the local population. Water available for irrigation, the potential to diversify cotton-wheat-livestock production system with vegetable and fruit growing characterized by high and unique agrobiodiversity, along with good research infrastructures and transport facilities are some of the factors that could lead to increasing livelihoods of the local population.
- 14) Through CRP1.1, development and adaptation of an innovative knowledge platform for addressing constraints in agricultural production will increase institutional functioning and livelihoods in Fergana Valley (Research Hypothesis 5). In addition, a policy framework ensuring land security of agricultural producers, improved access to market, information, technologies will promote sustainable agriculture and improve rural welfare (Research Hypothesis 6).
- 15) Innovative and combined policy, institutional and technological approaches to optimize water productivity and equitable allocation will lead to sustainable intensification of the cotton-wheat-livestock production system in Fergana Valley (Research Hypothesis 7).

- 16) Diversification of the characteristic vegetable-horticultural-potato production system through IPPM, improved seed and processing systems, marketing and adequate policies will increase nutrition and livelihoods of rural women and men and reduce environmental and social risks in Fergana Valley (Research Hypothesis 8).
- 17) Finally, integrating environmental and socio-economic analysis will help to develop optimal scenarios for trade-off resolution and up- and out-scaling in similar production systems of the CAC Region and globally (Research Hypothesis 9).
- 18) The Research Hypotheses were based on an analysis of constraints identified for the three Action Sites. They have been translated into a number of Outputs and Activities with deliverables (milestones) and timeframes as a basis for the CRP1.1 implementation plan.
- 19) The three Action Sites chosen are not only trans-boundary, but they also quite inevitably include gradients ranging from the most vulnerable conditions (representing SRT-2) to those more favorable, having the potential for sustainable intensification (representing SRT-3). These two conditions can not be entirely separated from each other in the geographic sense. Central command planning combined with the vast, often unsustainable efforts to intensify agricultural production in the former Soviet Union had lead to degradation of land and water resources in many areas (*i.e.*, a conversion from SRT-3 to SRT-2 conditions on large scales).
- 20) Establishing a solid baseline with inventory of stakeholders and institutions, market systems, database of natural resources, watershed map, maps of water user associations and rangeland boundaries as well as analyses of the baseline data and impact studies will be essential for the CRP1.1 implementation.