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IMPLICATIONS OF WATER SCARCITY ON AGRICULTURE IN CWANA REGION: LIMITATIONS AND POTENTIALS

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All countries in Central and West Asia and North Africa CWANA region in general, and WANA region in particular, have faced severe challenges in increasing their agricultural production over the last 40 years. This is mainly due to many factors, including a limited natural resource base of arable land and water, low and volatile rainfall with frequent drought, growing population, low rates of productivity growth, increased rural-urban migration, low public and private investments in rainfed areas, weak extension systems, inappropriate agricultural policies, and low adoption rates of new technologies. CWANA has achieved 2.9% annual growth rate in cereal production during the 1961–2002 period. Most of the growth is attributed to productivity enhancement in the first place and to area expansion in the second place. Cereal yield and area grew by 1.5% and 1.3% during the same period.

WANA countries alone had net cereal imports of 45.1 million tons in 1997. Cereal net imports are expected to increase to 73.1 million tons by 2020. Wheat imports alone, of 37.8 million tons, accounts for 52% of the total cereal net imports in 2020. Similarly, imports of livestock products are projected to increase substantially during the next two decades. Food consumption pattern is expected to change dramatically during the next 20 years in response to increases in population, per capita income and changes in consumer preferences. Meat per capita consumption is projected to increase rapidly, by 29% for poultry and 19% for beef. Per capita consumption of other livestock products will increase as well. Milk and sheep/goat per capita consumption is expected to increase by 14% and 12%, respectively, between 1997 and 2020. Only the per capita consumption of two major cereal commodities, wheat and maize, is projected to decrease by 2% and 16%, respectively.

Available information on water poverty index (WPI) and its sub-indices (resources, use, access, capacity, and environment) are used to monitor the performance of scarce water in CWANA region. Although, a negative association between resources and use is to be expected a priori (the more scarce the resources, the better use is made of them), the positive correlation between these two indicators of 0.30 suggests that water resources are misused in CWANA region. Similarly, the positive correlation of 0.21 between resources and environment is not consistent with a priori expectations of negative association (the more scarce the resources, the more attention is paid to conservation generally), indicating that water resources in the region are not sustainably managed. The negative correlation between resources and access sub-indices also contradicts with what one might have expected, suggesting that people in the region do not have adequate access to the available water resources. There is positive association between the WPI and the human development index (HDI) for CWANA countries. Similar positive correlation is found between WPI and food security index (FSI). Preliminary results of regression analysis indicate that increasing WPI by 1% will increase per capita grain production by 4 Kg per year, thus contributing to increased food security.

WPI sub-indices reveal that water availability (resources) is the most limiting factor to the development of water sector in all CWANA countries, except Eriteria, Ethiopia, Kazakhstan, kyrgystan, and Sudan. For Eriteria and Ethiopia, improving population access to clean water and sanitation and enhancing access to irrigation would be more productive investments to improve the efficiency of water sector. However, environmental attributes, such as water quality, water pollution, regulations, and information capacity are the priority areas for interventions in Kazakhstan, kyrgystan, and Sudan.

Available information indicates that scarce water resources are poorly managed and inefficiently used in the dry areas of CWANA region. Irrigation accounts for 80–90 per cent of all water consumed in the region, thus, improving on-farm water-use efficiency (FWUE) can contribute directly to increased availability of water. Six empirical studies on economic assessment of FWUE in agriculture,

jointly conducted by ICARDA and ESCWA, demonstrate the low ratios of water-use efficiency in crop production. FWUE for wheat, for example, was found to be 0.61 in Radwania (Syria), 0.37 in Rabea (Iraq), 0.65 in Nubaria and Beni Sweif (Egypt), 0.30 in Al Ghor (Jordan), and 0.77 in Ninavah (Iraq). These estimates indicate that farmers over-irrigated wheat by 20–60%. It is, therefore, possible to save an enormous amount of water which can be used to expand the wheat growing area, and thus increase total production, or to produce other crops. Alternatively, farmers can increase the wheat yield considerably under current levels of water use, and with improved water and crop management practices. Either option can contribute greatly to food security in the region.

In assessing the effect of various variables on water allocation decisions, results reveal that after planting crops, producers do not respond to water prices in making subsequent short-run decisions. Since water prices in the study areas were highly subsidized, they did not have a major quantitative impact on water allocation. Land allocation, crop choice, irrigation technology and output prices are the main determinants of multi-crop water-use decisions. Because water charges are very low, only high increases in water charges can reduce the amount of water used for irrigation, which in turn will greatly reduce farmer income. Producers perceive water as a fixed input in the short run, but allocatable among competing crops on the farm. Results suggest that an increase in water availability is allocated most heavily to crops with relatively higher requirements, like cotton, tomato, potato, sugar beet, and berseem, rather than to crops with relatively low water requirements, such as wheat and barley.

ICARDA research has shown great potentials for increasing water productivity through the use of supplementary irrigation, water savings by improving on-farm water use efficiency, water harvesting, deficit irrigation, improved cultural practices, and germplasm improvements. To disseminate these technological advances to farmers, ICARDA has developed and implemented several regional projects, using integrated natural resource management approach (INRM) in cooperation with national programs and full participation and involvement of rural communities. The interventions include a package of technical, institutional and policy options targeting conserving the scarce water resource and optimizing its use. If policy makers encourage the adoption of appropriate technical as well as incentive packages, water-use efficiency can be improved. By doing this, ample water will be available for productive use leading to increasing water productivity and consequently agricultural production.