



Future of Food Security

Pakistan must make substantial progress towards food security and LTRE is a route that it must take to promote cultural change and shift the paradigm to establish that this is not an expense but an investment.

By Nisar A Memon

Pakistan is the cradle of a 5,000 years old 'hydraulic civilization' which can be witnessed at the UNESCO World Heritage Site of Moen-Jo-Daro (Mound of the dead) in Sindh. Water gives birth to human settlements and it is the same water which has destroyed these settlements due to insufficient understanding of natural phenomenon, inappropriate response to river flows or even indifference to understanding the nature of rivers.

No society can ignore the importance of water for its survival, security and sustainability. Human progress is directly proportional to the responses to changing and complex challenges faced by mankind.

Water for survival

Pakistan is an agro-based economy; being the world's 4th largest milk producer, 4th largest mango producer and 5th largest cotton producer with about 60% of its population of over 200 million employed in agriculture and related sectors and contributing the

largest foreign exchange component to the treasury. It has to depend on water for its survival.

Its 7,250 glaciers, its Karakorum and Hindu Kush range of mountains and the Indus basin rivers are its key assets and a source of water for drinking and agriculture. However, like all resources they need to be used judiciously and managed well to cater to its growing demands. Pakistan's per capita water availability currently estimated at 1066 cubic meters is 'stressed' by Falkenmark index and in 2025 it is forecast to be 858 cubic meters at 'scarcity' level. This calls for urgent attention to population and water management.

Water for Security

Human security requires a close watch on water security since the food directly depends on water which in turn has interdependence of natural resource security, institutional security, infrastructure security and territorial security. Territorial security is best handled by an appropriate foreign

policy backed by well-equipped and professional armed forces to meet the overt and covert challenges backed up by the will of nation. Natural resource security is impacted by earthquakes and climate changes causing glacier lake outburst floods (GLOFs) and river floods. Institutional security is assured by educational and research institutions like centres of excellence of our universities as well as WAPDA, Pakistan Meteorological Department, GCISC, PCSIR, PCWR and SUPARCO. Infrastructural security requires continuous watch on the Indus river basin with the world's largest irrigation network structures of dams, barrages and canals providing water to 36 million acres of contiguous land. The Indus Waters Treaty (IWT) inked in 1960 between Pakistan and India and brokered by the World Bank, is considered to be a living example of a successful water treaty having survived several wars between the two countries, mainly because of a dispute resolution

mechanism in IWT.

Climate changes are now a stark reality challenging us to respond to glacier melts, coastal waves, floods, droughts and famines. Nations with people-centric policies and investment in early warning systems and structures, can best respond to monsoonal and highly variable flows to avoid uncertain futures. However, it all requires cooperation among the provinces in the country and cooperation with the neighbours in sharing the data and information under a transparent global system for credibility of data acquired by scientific stations and equipment under watch by all concerned.

Water for sustainability

Economies grow when there is progress in managing their resources on a well-planned sustainable basis and not by knee-jerk management. Economy is driving not a two-wheeled vehicle but of steering the ship in the troubled waters of the World Order with global societies going through known and hidden transformation, new alliances of vested interests surfacing without any regard to morality with a motto of 'enemy of my enemy is a friend.' Neighbours irresponsibly threatening the use of water as weapon, are challenges to sustainability. Today statesmen are needed to ensure sustainable water for their societies by negotiation and not by war drumming.

Several responses in history with focus on LTRE

The materially developed world has used several ways to ensure security of its waters for their people using scientific experiments and technologies. Chemical fertilizers are one such example. Pakistan has been using chemical fertilizers based on research for improved agriculture. But additionally, research was extended in England and America, as early as 1834, to what is termed as 'Long Term Research Experiment (LTRE).' The long-term experiments in agricultural research are important for sustainable solutions to generate valuable scientific knowledge on long-term outcomes of different crops, cropping systems and practices under a changing environment.

LTRE and its History

In different areas of the world, for sustenance of human life, experiments were performed on different crops producing innumerable varieties of grain and farm products. The introduction of science and technologies accelerated these experiments and with the advent of the textiles industry to fulfil the appetite of machines, the improved yields of cotton surfaced while, with population growth, the requirement for wheat,

rice, vegetables and fruits increased. The societies producing more than their own requirements started trading their products which further got a boost with improved means of transportation of the industrial era. This phenomenon required further and long-term scientific research to study the impact of several variables such as seeds, water, fertilizer, land, temperature, crops, cropping zones, etc. on agricultural sustainability and to provide long-term implication of biological changes.

The Broadbalk Experiment is the oldest and continuously running agricultural experiment in the world at Rothamsted Research in Hertfordshire UK. It had its first winter-wheat crop sown in autumn 1843 and this crop has been sown and harvested every year. The experiment tests the effects of various combinations of inorganic fertilizer and farmyard manure on the yield of wheat. Since then, thirteen LTRE have been established and are working in the USA, Australia and Argentina.

Chemical, mechanical and cultural practices have a long-term impact on soil, crops, livestock and environment. The climate has, over time, greatly impacted agriculture and even caused famines - a factor to reckon with for agriculture sustainability towards food security. The current climate changes have added a new dimension to research which needs to be incorporated in the design of LTRE.

LTRE debut in Pakistan at UAF

Driving to Faisalabad to participate in the 'International Conference on Sustainable Agriculture in Pakistan' jointly organized by the University of California, Davis, USA and the University of Agriculture, Faisalabad (UAF), one remembered the green Faisalabad of yesteryears which has given way to industrialisation and growth in urbanization. Yet, in the middle of the city remains the green historic UAF determined not to be cowed down and continues to contribute to food security since the sixties. It is the pride of Pakistan as one of the three HEC Centres of Excellence addressing the W-E-F nexus - the Mehran Engineering University (MUET) for Water, National University of Science & Technology (NUST) for Energy and UAF for Agriculture and Food.

Prof Dr Ashfaq Ahmad Chattha, Chair of Climate Change Centre at the UAF has initiated the proposal of a farming system research study on a 300 acre piece of land dedicated for 50-100 years on a particular cropping system like wheat-cotton, wheat-rice and corn -potato.

Recommended Way forward

Pakistan must welcome this first LTRE as a pilot. At the conclusion of my presentation at the conference, I would like to share the following points for consideration as the way forward on LTREs:

- **Leadership Commitment** is imperative for success. This pilot should be followed by one each in six territories of Pakistan, each subject relevant to that area. This way 6 LTREs will be in place covering different cropping systems. Leadership must ensure that laws are implemented and new laws are needed to support LTREs.
- LTRE Campaign and Cooperation should be made people centric. LTREs should not be restricted to conferences and seminars but take it to people as a campaign for greater participation and transparency to make it people-centric not just scientist-centric. The experiments will yield better results and would be sustainable if there is a public-private partnership. This will also result in increased cooperation among all territories and people of Pakistan.
- LTRE Portal should be set up to share information amongst all on undertaking of each LTRE and results produced. The Portal should identify institutions, researchers, professional practitioners and their work related to LTREs, information and linkages of genome and precision agriculture technologies and traditional knowledge. It should connect us to global practices for greater productivity and yields. Above all, it must provide results of adaptation and mitigation programs to meet the climate change challenges.

I hope, with the launch of LTRE we will promote a cultural change and shift the paradigm to bring home the point that LTRE is not an expense but an investment and any more indifference to it is not an option since it is all towards security of water and food for the people of Pakistan. ■

Nisar A Memon, a former federal minister and a senator who chaired Pakistan Parliamentary Committee on Water Resources in 2003-4 and presented its Report, which can be seen at www.nisaramemon.pk. His passion for Pakistan's security has led him to pursue various dimensions of water environment in his current role as Chairman, Water Environment Forum, Pakistan.