동아시아 지역의 농업용수에 대한 장기전망

East Asia Regional Consultation on Water for Food and Rural Development

Mark Svendsen*

The Vision

Twenty-two representatives from East Asian nations and 4 resource persons met 17~19 May in Kuala Lumpur to develop a regional vision of water, food, and rural development for the next quarter-century. The region covered stretched from Myanmar to Japan and from Korea to Australia. Participants developed the following vision.

In 2025, all members of East Asia's still growing population will enjoy secure access to food, rural residents will live in vibrant communities with access to a full range of infrastructure and services, and regional water resource systems will meet competing demands in a balanced and sustainable way.

Rural Communities

Participants envisioned rural communities that were static in size or growing only slowly. Extensive migration to urban areas was foreseen as residents, especially younger ones, sought out better and more exciting job opportunities. At the same time, those remaining in rural communities will enjoy steadily improving access to high quality services such as health care, water, electricity, communications, sanitation and transportation, and to attractive housing. Improved educational opportunities, especially at posthigh school levels, would also expand. These changes will help arrest rural flight

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* UN 컨설턴트

and provide a solid base for rural economic growth. Private industrial investment in rural areas will expand, absorbing labor and providing off-farm employment for agricultural household members. These developments will lead to higher real household incomes, reduce urban/rural income disparities, and slow migration to large urban centers.

Agriculture

Despite steady rural population levels, continued growth in overall regional population will result in increased demand for food. Rising incomes will lead to shifts in demand composition from food to feed grain and from cereals to vegetables and horticultural crops. At the same time, the agricultural land base will shrink as land is absorbed by expanding urban areas.

A bimodal farm size distribution will develop, with larger farms producing the bulk of agricultural output while more numerous smaller farms will be operated by part-time farmers. The larger farms will be professionally managed, employ hired labor, and be extensively mechanized. Output mix will become more diversified, and smaller farms will employ integrated farming practices mixing plant, animal, and fish production. Genetic improvements in both plants and animals stemming from bioengineering will result in higher yield potentials and lower water requirements. Water control and application technology will reduce losses, improve precision, and lower labor requirements.

Water

Water storage capacity, both above and below ground, will increase modestly as will interconnections among components of primary water conveyance systems. Groundwater extraction will increase, even in humid regions, as pressures on surface water resources mount. Information technology applications will result in more efficient reservoir operations. Improved protection will be provided to catchment watersheds. River basins will be managed in a comprehensive and integrated fashion. Water management at both basin and irrigation system levels will increasingly be carried out by private sector or stakeholder-based entities. Stakeholder involvement in river basin and irrigation system governance will increase.

Quantification of water volume and quality at all levels will increase significantly, making water more a commodity and less a public good. Users will pay for most water-related services on a fee-for-service basis and public subsidies on irrigation services will shrink.

Driving Forces

A number of forces expected to drive change in the first quarter of the 21st century were identified. Driving forces were defined as trends which are beyond the capacity of national governments to influence significantly over the medium run.

Demographic

The most potent demographic trends are continued growth and continuing rapid urbanization of regional populations. These trends have broad implications including increasing demand for food, increasing demand for municipal water supplies, a stagnant agricultural labor pool, loss of agricultural land to urban expansion, and pollution of surface and ground water resources by urban wastewater discharges.

The regional vision runs counter, to some extent, to the trend toward increased urbanization. Participants felt that strong and proactive efforts were required on the part of national governments to provide transportation, communication, and utility infrastructure and quality social services in rural areas, encourage private investment in industrial development, and generally improve the quality of rural life, thereby reducing rural/urban income disparities and slowing rural outmigration.

Economic

Powerful economic trends will also affect the sector. These include:

- Industrialization
- Further penetration by market-based economic strategies
- Falling real energy costs
- Continued global trade liberalization
- Rising real incomes

These trends will lead to further pressure on water resources through rising demands for industrial use, changing patterns of food demand, further exposure of agriculture to international competition and international prices, reduced groundwater pumping costs, and expanded non-agricultural employment opportunities.

Technological

Information technology (IT) and biotechnology were the technologies identified by participants as having the greatest potential impact on the sector. IT has potential application in improving reservoir operations, more precise quantification of the hydrologic cycle components leading to improved management, and improving access to information on prices, markets, weather, and water availability. Biotechnology offers hope of increased yields, improved pest and disease resistance, reduced water use, and improved tolerance to salinity. Neither of these topics has been adequately explored in terms of their implications for irrigated agriculture.

Institutional

Institutional driving forces include the continuing trend toward privatizing public service provision and the growing demand for stakeholder voice in resource manage- ment and allocation decisionmaking. The worldwide tendency toward privatizing delivery of services (from toll road access to electricity and domestic water supply) is pronounced and accelerating. Efficiency and effectiveness in

irrigation service delivery can often be enhanced in a similar way, as demonstrated extensively in Australia, and pressures to reform water management along these lines throughout the region will continue to be strong.

The continuing spread of democratic principles in the region will encourage stakeholder participation in decisionmaking regarding water resource management. The effectiveness of this approach in encouraging compliance with decisions taken and in minimizing conflicts is clear.

Environmental

Three driving forces in the environmental arena are expected to strongly affect water and agriculture. The continuing unsustainable exploitation of forest resources in the region adversely affects watershed hydrology and increases the rate of sedimentation in reservoirs and siltation of irrigation canals. These are costly externalities for the sector. The continuing use of waterways for disposal of untreated or inadequately treated industrial and municipal wastes has serious negative effects on downstream agricultural water users and rural communities who depend on these supplies. It can render water unfit for irrigation use or lead to levels of contaminants in crops, especially table vegetables, harmful to human health.

The most powerful trend in this area, though, is undoubtedly the burgeoning public concern with environmental degradation. This concern will grow along with the expanding East Asian middle class, contributing an important and useful perspective to resource development and management decisionmaking. Its impact will be felt in several areas related to irrigated agriculture and rural development. These include decisions on providing additional storage in river basins, quality of irrigation return flows, efforts to control watershed degradation, and efforts to control urban and industrial wastewater pollution of natural waterways.

Choices Facing National Decisionmakers

The driving forces described above are, by definition, largely beyond the direct control of national decisionmakers. Combined with the vision of the future, however, they lead to a number of important policy choices.

Food Security

A critically important decision faced by all governments in the region is that of the appropriate target level for food self-sufficiency. The choice of full versus partial production self-sufficiency has profound implications for many other policy and resource allocation decisions affecting the sector. Some countries in the region already opt for less than complete self-sufficiency, and others will likely follow suit in coming years. As demand patterns change in response to rising incomes, a distinction will emerge between food and feed grain production, and the self-sufficiency question will have to be faced

for each.

In addition to an overall target level for food self-sufficiency, governments also must choose strategies for responding to short-term variability in production. Basic alternatives relate to the use of stored buffer stocks or international markets to make up shortfalls.

The size of potential purchases by the larger nations in the region, China and Indonesia, were of some concern. In the event that either nation adopted a strategy of partial self-sufficiency, or if there are major unanticipated shortfalls in production, the quantity of rice sought in international markets could be quite large, and, at least over the short run, difficult to procure. Upward pressure on prices could also be significant, affecting all regional buyers.

Equally significant choices must be faced among alternative subsidy environments. Although international pressures for domestic market reforms and for liberalized international trade regimes will continue to be strong, remaining subsidy program in both developed and developing countries will not be easily dismantled. Concerns range from national stability if urban food prices increase to the viability of particular classes of farmers in a market price environment.

Water Reallocation

Though abundant, renewable water resources in the region are finite, and competition for available supplies will ensue in a growing number of basins. This will lead to a need for additional storage, conservation and reallocation, or both. One of the most important public policy choices to be faced in coming years will be that of the appropriate mix of responses to shortages and competition. Where reallocation is required, the choice between market and administrative mechanisms for accomplishing this will be equally important.

Shared Rivers

The region possesses one major international river, the Mekong, and numerous cases where states or provinces share jurisdiction over rivers. Although the advantages of planning development and management across an entire river basin have been clearly demonstrated, political and other considerations have often prevented the necessary cooperation. In addition to choosing to approach river basin development and management jointly, involved parties must undertake the equally challenging task of developing effective institutions for the task.

Regional Strengths and Weaknesses

Participants identified lists of regional strengths and weaknesses related to realizing the vision developed. On balance, the region enjoys a number of strong advantages which afford it an excellent chance of achieving the vision developed.

Strengths

- Generous natural resource base (water, soils, energy)
- Abundant labor
- Long experience with irrigation
- Extensive domestic markets
- Under-exploited agricultural yield potential
- Rapidly strengthening communication and transportation networks
- High levels of education
- Strong R&D capacity
- Political stability
- Strong institutions for regional cooperation

Weaknesses

- Growing population pressure on resources
- Wide disparities in incomes and standards of living between rural and urban areas
- Wide disparities in infrastructure among sub-regions within countries
- Trade barriers
- Insufficient funding for R&D
- Weak government commitment to institutional reforms in the water sector
- Weak capacity to analyze and formulate sound water-related policies
- Small farm sizes