

Abstract: Oriental philosophers have given top priority to food for orderly state affairs as well as personal wellbeing. In past, Nepal had a strong agricultural economy that was based on indigenous irrigation systems known as farmer managed irrigation system (FMIS). State policy helped promote these systems. But contemporary Nepal opted for state control on irrigation water through building large scale public irrigation systems. In the last 43 (1957-2002) years of planned development, the government spent 70% of USD 1.3 billion on these systems, which covered 30% of the irrigated area in the country; remaining 70% being with the FMIS. Despite this investment, these systems were subsistence-neither promoted themselves as an enterprise nor helped enhance agricultural productivity leading to social insecurity. This social insecurity was much reflected in the country's increasing import of food, mass exodus workforce for employment abroad and added socio-economic vulnerability due to climate change. Thus donors and government recommendations to improve food security situation that centered around i) expansion of irrigated area, ii) irrigation management transfer and iii) agriculture extension seem to have failed in Nepal. These failures asked for alternative institutional development solution whereby public irrigation systems are i) localized to establish system's operational autonomy with ownership and governance, ii) treated as a rich resource-base with water, land and labor and iii) recognized as cooperative enterprise of local stakeholders by law with authorities to enter into joint actions with relevant partners for promoting commercialization and environmental quality of irrigated agriculture.

Chinese social philosopher Confucius (551-479 BC) had listed a number of constituents (essentials) for running state affairs in an orderly manner-

These constituents include constitution, government, military, food etc. When his disciples continued to ask to choose the one that was most important, he opted for food.

In contemporary Nepal, a large number of people are hungry, poor and unemployed. In the ancient time, Nepal had its glory and richness of a powerful agricultural economy [Gautam and Khaniya, 2010].

1. INDIGENOUS SYSTEMS OF IRRIGATION

Irrigation water served as both the spiritual and material foundations of Nepal's community civilization. The rich cultural tradition, arts, artifacts and architecture of Kathmandu valley are attributed for the network of irrigation systems supporting advanced and intensive agriculture activities. Spiritual mission, royalty and religious trust (known as *Guthi*) coupled with community initiative for irrigated agriculture was the main driving force in promoting local cooperative enterprises. The state encouraged the development of such trusts. These trusts allocated a portion of their income out of religious performance to assist irrigated agricultural activities on which livelihood of the trust's members was dependent.

It is rather fascinating to note that even in the ancient city planning, like that in the layout of *Handigaun*, the ancient capital of Nepal, irrigated agriculture, as identified with the rural areas, was incorporated in the city landscape in the manner that the available land use was maximized by appropriate zoning of land for agricultural use, human settlement, market place, water conservation ponds, pasture lands and religious sites [Tiwari, 2002].

Before 464 AD, King Shankar Dev constructed Shankhu *Rajkulo* (royal canal) tapping water from Sali Nadi (River) for the purpose of drinking and irrigation in the Sankhu town [Pun, 2001]. During Lichchavi Period (78 to 880 AD), the local people developed the indigenous system of integrated water utilization by combining stone water conduit along with the ponds and canals. In the first half of the fifth century, a grave water crisis occurred due to landslide in the capital city in Kathmandu valley, popularly known as Nepal *Khaldo* (valley). To resolve this crisis, the Lichchavi King commissioned a large water supply project, taking advantage of the accidentally created ponds as well as of the existing natural channels of water. This system was later called the *Rajkulo* (royal canal) [Tiwari, 2002].

¹ Based on this paper a talk was delivered at the National Conference on Water, Food Security and Climate Change in Nepal organized by International Water Management Institute ((CGIAR Research Program) in Kathmandu on 23-24 November 2011.

² Prof. Upendra Gautam, PhD, is President of Consolidated Management Services Nepal (CMS), a consulting firm engaged in irrigation management works for the last 20 years. CMS is partner institution of GWP Nepal/JVS.

Argeli Jethi kulo built around 1543-47 AD in Palpa district in western Nepal represents the example of religious Guthi- (religious trust) supported irrigation system [Pradhan, 2002]. This system was developed during the rule of King Mani Mukunda Sen I of Palpa. It was built to cultivate rice to generate revenue for meeting the worship expenses of God Rishikeshav Narayan, located on the bank of river Kali Gandaki at Ridhi, Palpa district.

During King Baliraj of Kalyan dynasty (1400 AD), farmers were supported to build canals in a remote district *Jumla* located about 2500 meters above the sea level (Devkota, 2002). Besides the state support for the irrigation canal construction, the local communities have taken initiative in constructing irrigation channels for paddy cultivation. Along the banks of Tila and Sinja rivers, many community initiated irrigation systems maintained and managed by the community are functioning.

State policies and practices were historically conducive to strengthen community roles in water resource management. They provided top priority to water and food security of the people under the active initiative of the local community. In the 17th century, the edict of King Ram Shah of Gorkha mandated that water resources related conflicts were to be settled at the community level. Though such mediation had to take into account local power structures, it allowed community initiatives and governance structures to evolve. Hence, the indigenous tradition of Farmer Managed Irrigation Systems (FMIS) got deeply rooted in the Nepali society over the period of time. In the directive of King Jitendra Malla (circa 1682 AD), a Rajkulo was constructed from Mahadev Danda, some 6 km far from Bhaktapur city, collecting water from Mahadev Khola at Nagarkot to Sundhara of Thunthu Palace at Durbar Square in the heart of Bhaktapur city through this canal. In addition to the religious purpose of this water, it was used for irrigation, water mill operation, drinking water for the city populace as well as for fish farming. The King also instituted Guthi and formulated rules for the maintenance of these systems [Khaniya, 2004; and Wright, 2000]. The Italian religion teachers who visited Nepal in 1704 compared Kathmandu with Venice for its water management and settlement pattern.

Under the reign of General Bhimsen Thapa, the first Prime Minister of modern Nepal, a canal was dug out from the Pokhari (lake) of Raniban of Kirtipur, 20 kilometers from the heart of Kathmandu in 1829 AD. Farmer representatives or persons designated for the purpose could collect water tax for the use of water. The rate was fixed by the government. A system of water tax collection as service charge was in practice in those days too. The lake was allowed to have other functions as well. Fishery was promoted in these three lakes to generate income for the state [Nepali, 1965].

Rana regime (1846-95) did not invest except in a few public irrigation systems like Manusmara, Chandra Nahar, Banganga in central, eastern and western Nepal Tarai. They allowed the communities take initiative for irrigation channel construction. Once the land got irrigation facility, the status of the land would be changed and the government was able to collect more revenue without much investment. It was a customary rule that land-revenue from unirrigated land went to local Raja-Rajautas (nobles) and the revenue from the irrigated land went to the central government. As such the hilly districts did not readily welcome the central administration role in local irrigation development.

2. PRESENT STATE OF IRRIGATION SYSTEMS

It seems we have refused to learn from our own history and key institutional character of the indigenous Farmer Managed Irrigation Systems (FMIS) - that is, the local operational autonomy. After 1951, the role of the state rather expanded and attempts were made to extend the state control on irrigation water through constructing large scale government-administered public irrigation systems. By 2002 the area covered by government-administered irrigation systems was 320,000 ha (30%) while FMIS covered the remaining 70% (880,000 ha) (Paudel, 2009/2003; MOAC, 2010). The government department provides assistance to FMIS, which contribute about 40% of the food requirement of the country [Pradhan, 2011].

In the planned period of the last 43 years (1957-2002), the government along with multiple donors has invested USD 1.364 billion in the irrigation sector. This amount was half of the allocation (USD 2.7 billion) made altogether to agriculture, irrigation and forestry. According to an expert estimate, out of this amount 30% has gone to FMIS while 70% to the government-administered irrigation systems [Paudel, 2011].

An analysis of last 10 years data (1992-2002) indicated that the government was preoccupied with just maintaining a sort of *status quo* in terms of average productivity of major crops (paddy, wheat and maize) from the irrigated area. The reality is: less than half of the irrigated area gets irrigation only in the monsoon season, while less than a fourth of this is fortunate to have year-round irrigation.

Despite the practical feasibility of almost doubling the per ha productivity (4 MT) of the major crops like paddy, wheat and maize, the average crop productivity was clearly on the subsistence side [Nepal Agriculture Review, 1990].

3. CONSEQUENCES POOR IRRIGATION SYSTEMS

The net result of the subsistence irrigated agriculture throughout these years has been heightened social insecurity, which is reflected in a) increasing import of food, b) mass exodus for employment abroad, and c) increased socio-economic vulnerability due to climate change.

a. Food Import

Nepal has been transformed from food exporting to food importing country. Since last few decades, Nepal does not produce enough food to satisfy domestic demand. It has to import food equal to the domestic production deficit. According to the World Food Program (WFP), there was 316,000 metric tons food deficit in 2010, an increase by 139 percent from 2009. In 2009, agricultural trade deficit was USD 270 million, up from USD 157 million in 2003. Even if prices increase, Nepal will have to import at least the same amount of food, but it will have to spend substantially more. The WFP also reported that about 3.7 million people face risk of food insecurity in Nepal [Sapkota, 2011].

The domestic food situation is aggravated by prices that have reached the second highest level since 1990. Rising food prices have triggered a wave of protests across the globe and forced countries such as India, Russia and Vietnam, among other nations, to impose an embargo on food grain export. These events directly or indirectly affect food prices and food availability in Nepal.

A Nepali spends, on an average, 59 percent of his/her income on food. Of this, about 58 percent and 15 percent are spent on breads/cereals, and fruits/vegetables, respectively. Since food prices are already high in the domestic market, any further price rise will force more people to scale back discretionary expenditures and savings, which will directly affect investment, economic growth and trade balance [Sapkota, 2011].

b. Mass Exodus

The daily queues for passports at the Foreign Ministry and the huge lines of youth at the manpower recruitment facilitation centers indicate that, despite reports of exploitation, cheating by middlemen, low pay and hardships, Nepalese are more desperate than ever to get out of here.

According to a 2011 ILO report, almost 40 per cent of Nepal's population will come of working age in the next 15 years. It is ironic that this nation survives on the money sent back by the same people whom it has failed to support. The strategy of successive governments has been to manage Nepal's growing unemployment with a mass exodus, not just of the working population but also of the knowledge people who keep a check on the political authority [Acharya, 2011].

According to recent data, around 20 per cent of Nepal's population mainly from farming background work abroad. The failure of the government to sustainably improve agriculture and employment has forced them off the land. The fallow fields in the countryside are a testimony to the absence of able-bodied youth to work in the farms [Acharya, 2011].

No one has ever counted the illegal numbers who go overland to India, and from there to another country. Nor anyone has taken count of the Indians who are conveniently and profitably employed here. According to a JP Morgan Study, India was the world's largest remittance recipient in 2006-2007. The top 10 destination countries for the Indians included the UAE, Saudi Arabia, US, Bangladesh, Nepal, UK, Sri Lanka, Canada, Kuwait and Oman [Dhawan, 2008].

c. Climate Change

Melting Himalayan glaciers and other climate change impacts directly pose a new challenge to the water and food security of more than 1.6 billion people in South Asia - Nepal included.

Analyzing current trends and scenarios based on projected temperature increases, an Asian Development Bank (ADB) study produced by the International Food Policy Research Institute entitled "Addressing Climate Change in the Asia and Pacific Region: Building Climate Resilience in the Agriculture Sector" warns that four countries in South Asia – Afghanistan, Bangladesh, India and Nepal" are being particularly vulnerable to falling crop yields caused by glacier retreat, floods, droughts, erratic rainfall and other climate change impacts (www.iwapublishing.com, 2011)

The study warns that if current trends persist until 2050 (by this time Nepal's population is projected to be 80 million), the yields of irrigated crops in South Asia will decrease significantly – maize (-17%), wheat (-12%) and rice (-10%) – because of climate change-induced heat and water stress. The resulting food scarcity will lead to higher prices and reduced caloric intake across the region.

It should be further noted that almost half of the world's absolute poor live in South Asia, where they tend to depend more on rain-fed agriculture and live in settlements that are highly exposed to climate variability. Thus Nepal will have to face the formidable challenge induced by climate change for which it cannot be held accountable at all.

4. ADDRESSING THE ISSUES

For the last 25 years, the government and donors recommendations to improve the food security situation in Nepal has centered around i) expansion of irrigated area, ii) irrigation management transfer [Abernethy, 2000] and iii) agriculture extension. Now there is much talk about commercialization of agriculture.

The solutions that are fundamental to generate wellbeing and prosperity from existing relatively poor and under-productive irrigated agriculture are never systematically identified, pursued and mainstreamed into policy and program initiatives. So was to happen as most of the time it was the need of the government to rather spend the money than to sustainably enrich the people in terms of their well being and institutional capability development. Let us explore some of these solutions, which, for me, are more institutional.

a. Localization

Most of the financial resources have been invested in centralized large scale public irrigation systems. It was good for centralized control on irrigation water administration but bad for promotion of local ownership, governance, modernization, regular maintenance and operation of these systems. Lack of local ownership, governance, modernization, regular maintenance and operation of the irrigation systems seriously affected timely, effective and fair decision making in the irrigation system - whether it was water acquisition, allocation, distribution, maintenance and operation or resource mobilization.

Indeed, the irrigation bureaucracy was restructured at times. But these restructurings were more motivated to bypass the establishment of a local governance framework and keep intact the centralized sectoral control on public irrigation systems. Restructuring has not brought irrigation closer to the farmers nor has it contributed in developing local ownership, governance, modernization, regular maintenance and operation of the irrigation systems.

Localizing public irrigation systems is a pre-requisite to develop sustainable institutional infrastructure in them. Localization may be defined as the reform process of centralized public irrigation system whereby it not only operationally belongs to the local water users association (WUA), relevant local government unit, and the community having a larger stake in the irrigation, but the representatives of the WUA, local government unit and community are also mutually accountable to govern, maintain and operate the irrigation system in the best local interest.

The National Water Resources Strategy (2002) wherein the government takes initiative to apply river basin approach to develop and manage water resources, may help fundamentally reform public irrigations systems by localizing their governance. Water access mechanisms developed under this approach may enable institutionalizing an imaginative arrangement that encourages representation of stakeholders having roots in the local setting.

b. Resource Base

The tragedy of public irrigation systems in Nepal is that they are poor and less productive despite their richness in natural endowment. If the water, land and human resources of an irrigation system are combined together, perhaps they form the richest resource base in the country.

Relative poverty and under-productivity of these irrigation systems is clearly the function of their lack of local grounding and operational autonomy. Centralized governance of local irrigation systems does not allow them to be innovative, negotiative, efficient and equitable in the local context. As irrigation system inherently has an indigenous civilizational identity because of its nature and history of the local water, land and people, centralizing their governance deprives them from taking any initiative to get benefits from the comparative advantages it offers, and innovatively govern,

finance and modernize their system. As such, no capable person will like to remain engaged in an area where s/he cannot envision any socio-economic prosperity.

Localization of erstwhile centralized irrigation systems would recognize and appreciate the rich resource base of the irrigation systems and their comparative advantages. This will help them indigenously promote their resource base more productively and efficiently, and that will attract the capable people to add value and dynamism to the agricultural enterprise.

c. Cooperative Venture

A public irrigation system functioning as a localized irrigated agricultural enterprise will be a cooperative venture. WUA, local government unit/s, and other stakeholders will be members of the cooperative venture. Members will share the cost and benefits of the enterprise and they will be mutually accountable to one another. The members' role and responsibilities will be specified in the regulation of the cooperative venture that will be recognized by law. The cooperative venture will be able to act as a legal person in the matters of borrowing, trade, marketing, representation, agro-industries, and any other joint activity with other legal persons that support and promote commercialization and environmental quality of agriculture.

A strong localized cooperative venture can holistically nurture, manage and harness its resource-base and adapt to the climate change requirements. But we must be very strategic in this context. In the name of climate change and food security requirements, a section of powerful global players are promoting their commercial interest at the cost of indigenous sustainability and long term local viability of the Nepalese farming. For example, efforts are being made under bilateral project to kill sustainability and long term local viability of Nepalese agriculture by introducing hybrid seeds (Bhattarai, 2011). We may, on the other hand, learn from a Chinese experience. What was done there sounds simple: Seeds from the historically warm ecological region were used in cultivation in region with increasing temperature- the local government and farmers' water users association became the cooperative partners in this seed transfer and adaptation process - triggered by climate change (Reidinger, 2011). This experience showed that even in the context of climate change, strong local institutions become the effective institutional vehicle for inter-regional transfer and use of seed - the most important component for improved agricultural productivity.

This solution does not entail as much time and cost that breeding of new seed variety might have taken.

At the end of my speech, let me quote Kautilya (321 BC to 290 BC), the sage statesman of Magadh Desh. He, who seems to have learned from Confucius, said, "There is enemy equal to hunger. Poverty is death while living. There is nothing uneatable for a hungry one. The poor one is despised (hated) by his own wife. Learning is wealth for the poor."

The ultimate question is: Could we still afford to refuse learning?

Thank you for your kind attention.

REFERENCES

- Abernethy, Charles L. [2000]. Management of Water and Irrigation Facilities in Effective Irrigators Organization for Participatory Management. Proceedings of the Workshop organized by DSE-MARD and MAF. Quy Nhon, Vietnam.
Acharya, Anurag [2011]. "Lost to the Land," Nepali Times, 06 MAY 2011 - 12 MAY 2011.
- Bhattarai, Anil [2011]. Better Ways than Monsanto, The Kathmandu Post, 1 November.
- Devkota, Devi Dutta [2002]. FMIS in the Highlands of Nepal [in Nepali] [unpublished].
Dhawan, Himanshi [2008]. "India World's Largest Remittance Recipient," Times of India, 20 June.
- Gautam, Upendra Gautam and Ganesh Khaniya [2010]. Farmer Managed Irrigation Systems in Nepal: People-Centered Governance Alternative, Surendra R. Devkota Ed., Nepal in the 21st Century, Nova Science Publication Inc., USA, 2010.
- <http://www.iwapublishing.com/template.cfm?name=news369> [2011]. ASIA: ADB study finds climate change is impacting on water and food security (08/09/09)
- Khaniya, Ganesh [2005]. Traditional Water Management Practices: A Case Study of Bhaktapur City. Kathmandu, Nepal: Jalsrot Vikas Sanstha/Nepal Water Partnership.
- MOAC, [2010]. Statistical Information on Nepalese Agriculture 2009/2010 (2066/67). Ministry of Agriculture and Cooperatives, Agri-Business Promotion and Statistics division, Nepal, December 2010
- Nepali, Chittaranjan [1965]. Shasan byabastha ra Sudhar Karya, administrative system and reform activity, In General Bhimsen Thapa ra Tatkalin Nepal, (General Bhimsen Thapa and then Nepal) in Nepali, Kathmandu, Nepal: Ratna Pustak Bhandar.
- Paudel, Som Nath [2059/2003]. Irrigation in Nepal (in Nepali language), Jalsrot Vikash Sanstha, Kathmandu, Nepal.
Paudel, Som Nath [2011]. Author's Discussion with Him, October.
Pradhan, Prachanda [1989]. Patterns of Irrigation Organizations in Nepal: A Comparative Study of 21 Farmer Managed Irrigation Systems, Colombo: International Irrigation Institute.
Pradhan, Prachanda [2011]. Revitalizing Irrigation Systems for food security: Vision and Approaches in Nepal Irrigation Systems (A Keynote Speak Paper), National Conference on Water, Food Security and Climate Change in Nepal, International Water Management Institute and Department of Irrigation, 23-24 November 2011, Kathmandu, Nepal.
Pun, Shuku [2001]. Role of Gender in Sali-Nadi (Shankhu *Rajkulo*) Irrigation Management: A Case Study. In Upendra Gautam; and Shrish Rana (Eds.) Challenges to Farmer Managed Irrigation Systems: Proceedings of the International Seminar held on March. Kathmandu, Nepal: Farmer Managed Irrigation Systems Promotion Trust.
- Riedingger, Richard [2011]. Informal Communications of Richard Reidinger, formerly task manager/economist of the World Bank Projects in China, with Upendra Gautam, 27 April and 23 May. Reidinger writes, "Of late, they have been instrumental in "Mainstreaming of Climate Change Adaptation into Irrigated Agriculture Project," which was attached to the huge Irrigated Agricultural Intensification III Project or IAIL3 just closed at the end of 2010. WUAs have become a key part of both IAIL3 in terms of providing a primary mechanism to teach the farmers about climate change adaptation as related to irrigation actions the farmers can take to mitigate climate change impacts, etc. One of the actions taken by farmers with the WUAs under the project was to change crop varieties.To compensate for warming temperatures, China has recently been using a little trick ... that might also work in Nepal. They have been introducing varieties from northern areas into southern areas (as well as breeding for drought resistance). This type of varietals change is relatively easy and would save the plant breeders a lot of time and effort,"
- Sapkota, Chandan [2011]. Food Security in Nepal, Republica, 22 February.

- Tiwari, Sudarshan Raj [2002]. Lichchhavi Waterworks around the Capital Region. In *The Brick and the Bull*, Kathmandu, Nepal: Himal Books.
 - Upadhyay, Surya Nath, [2008]. *Legal and Policy Aspects of River Basin Management*. WWF/Nepal. 2008. *Stakeholders' Orientation in River Basin Management: Preliminary Training Manual*. Prepared by CMS Nepal for WWF/Nepal and Water and Energy Commission Secretariat, Nepal. Unpublished Report.
 - Vaidya, Yogesh Nandan [1999]. *Food Security in Nepal*, In Ratnakar Adhikari and Narad Bharadwaj (eds.) *Food Security Prospects and Challenges, Report on the National Workshop on Food Security Organized by Forum for Protection of Public Interest (Pro Public), SEWA Nepal and Action Aid, Nepal*. Kathmandu, Nepal.
 - Water and Energy Commission Secretariat [2002]. *National Water Strategy, Nepal, Kathmandu, Nepal: Water and Energy Commission Secretariat, His Majesty's Government*.
- Wright, Daniel [2000]. *History of Nepal*, Delhi, India: Aadarsha Enterprises.