Dynamics in Water Rights and Arbitration on Water Right Conflicts: Cases of Farmer Managed Irrigation Systems from East Chitwan¹

A. Shukla, N. R. Joshi, G. Shivakoti, R. Poudel and N. Shrestha²

INTRODUCTION

This paper examines the dynamism in water rights from the perspective of property creating process and its regulation and use and the mechanisms of arbitration when conflicts arise in the process. In conceptualizing irrigation development as property, the paper draws upon the property framework of Coward (1983). The development and subsequent management of irrigation systems involve investment of resources of some form, whether capital, labor, material or knowhow. The mobilization and investment of resources may occur in private, community or state management regimes. Those who make the investment develop claims on the water supply that is acquired and the physical structures that are created for acquisition, conveyance, regulation and distribution of available supply of water. Even in the case of the state management, the investment of resources for imgation development has a targeted area and users to serve.

Within the system each individual who has invested in the development and management of irrigation system has claim on the portion of available water supply. The collective claim on acquired supply of water is therefore apportioned into individual's claim. In defining the individual's claim the imgators come to a set of agreements that creates a social contract for



irrigators to realize their claims and acknowledge the claims of others. These agreements are apparent in the forms of **rules**, roles and sanctions to define, constrain and enforce individual's claims (Pradhan 1987). While in some irrigation systems the set of agreements are well articulated, in others there may be little codification. The water right **is** therefore realized **by** both, the mechanismsofaccess and acquisition of water and also by themechanismsofits' distribution and **use** (Ambler 1989).

The set of agreements that the irrigators develop to define the collective and individual claims are often equated with the flow regimes at the source and within the system. Available supply at the source and that acquired in the system are temporally fluctuating, **so** a uniform set of agreements may not be adequate for variable flow regimes. The irrigators therefore develop and enforce differential set **of** agreements to define the collective and individual claims depending upon the flow regimes at the source and within the system.

The claims that the irrigators develop collectively or individually have definite objective of directing and ensuring the benefits attainable from irrigation. The irrigators therefore make every effort to maximize the benefits of irrigation. Conflicts arise if moderation or alteration occur on the collective or individual claims either to limit or to expand these claims. Often the causes of such conflicts are man made both within the system or result from external intervention. However, they may also originate from ecological forces working both at the macro and micro levels. Degradation of catchment may reduce dependable supply in the streams and therefore increase the constraints on acquisition of supply in their irgationsystems. Another example is damage caused to the intake and the canal alignment due to increase flood frequency and sedimentation in the streams. Since changes resulting from such ecological forces have bearings on original claims of the irrigators, these become potential sources of conflict.

Several informal mechanisms exist for conflict resolution. The irrigators seek assistance of formal legal and quasi-legal institutions when the informal institutions fail in arbitrating the conflicts adequately. The informal mechanisms are therefore as important as formal institutions for conflict resolution.

This paper **uses** two set of cases of Farmer Managed Irrigation Systems (FMIS) from eastern part of Chitwan Valley to illustrate dynamism in water rights. The conflicts arising from water right issues in the irrigation systems and the roles of formal and informal institutions for arbitration on conflicts have been discussed. While one set of cases of Pampa, Chipleti and Cyampa Irrigation Systems presents the situation in water deficit irrigation systems, another set of cases of Badgaon, Jivanpur and Surtana Irrigation Systems typically presents situation in water adequate irrigation systems. Thus the two sets of cases provide opportunity to compare the nature and dynamics of water rights in water adequate and water deficit irrigation systems.

Study of available records and participants' interview are the two techniques used in this study for information gathering. While participants' interview helped understand the decision making

process, the study of available records helped analyze time series of events and processes at work for dynamics in water rights.

IRRIGATION DEVELOPMENT IN EAST CHITWAN: THE HISTORICAL ACCOUNT

Chitwan District is located at the south-western part of the country between longitudes 83^{0} 35' to 85^{0} 55'E and latitudes 27' 21' to 27^{0} 45'N. About three fourth of the area of Chitwan District is valley with flat to almost flat land havinghigh agricultural potentials. The valley plains are located between Mahahharat range of mountains in the North and Churia hills in the south. The valley is divided between eastern and western parts by Khageri river, popularly known as eastern and western Chitwan. The area south of Rapti river is called Madi Valley (Fig. 1).

Rapti river is the major water resource of east Chitwan. It flows from north-east to south-west and ultimately joins the Narayani river system. Perennial rivers like Lotharand Manahari flow along eastern boundary while Khageri flows along western boundary. Dhongre Khola' and Budhi Rapti are perennial streams which flow east to west parallel to Rapti river. Several streams flow into the valley from Mahabharat hills which are seasonal in character. These include Kair Khola, Pampa Khola, Tanhi Khola. Chatra Khola and Martal Khola.

In 1993, an irrigation resource inventory of east Chitwan wascompletedhy Irrigation Management Systems Study Group (IMSSG)⁴ at the Institute of Agriculture and Animal Science (IAAS), Rampur. The team could document the characteristics and performance of 88 fanner managed irrigation systems in the area. The total area under command of these irrigation systems was estimated to be 10,704 a of which 6,626 ha was perennially irrigated while 4,076 ha was irrigated only during monsoon (Shukla et al. 1994). In addition there are two government built irrigation systems in east Chitwan: Pithuwa Irrigation Scheme (600 ha) and Panchakanya Irrigation Scheme (600 ha). Both thesesystemsarenowmanagedhy theusersthroughtheirwaterusers'organization. East Rapti Irrigation Project (ERIP)⁵, a public sector irrigation development program, is being implemented in east Chitwan under credit assistance of Asian Development Bank. One major component of the project is to provide rehabilitation support to existing farmermanagedirrigation systems in the project area.

Chitwan Valley is one of the recently settled areas in the country. Until **1953**, there were scattered settlements of Tharus and Darais who are indigenous inhabitants of the area. The valley was then known as "malaria hell" due lo rampant malaria epidemic. In **1953**, the government initiated planned resettlement program in Chitwan under the Rapti Valley Development Project. The project started forest clearing and malaria eradication. In the same year floods and landslides





washed hundreds of villages in the adjoining hill districts. The government therefore decided to encourage the flood victims to settle in the valley and clear and cultivate the land, of which they eventually became the owner. During 1958-59, people from all parts of the country migrated into the valley; however, the major influx was from adjoining Lamjung, Tanhun, Gorkha, Baglung, Dhading, Nuwakot and Kaski districts.

The pattern **of** irrigation development in east Chitwan correlates with the settlement program in the valley. Of the 88 farmer managed irrigation systems inventoried in east Chitwan, **41** were foundtobedevelopedbefore 1953 and 47 wereconstructed after 1953. Of the 41 irrigation systems constructed before 1953, 35 of the systems were initiated by Tharus and Darais while **6** of them were initiated by migrant communities. Contrarily, of the 47 irrigation systems constructed after 1953, 34 were found to be initiated by migrant communities while only 11 of them were initiated by the original settlers (Shukla et al. 1994).

The migration into Chitwan Valley was also found to have resulted in changes in the management regime of the fanner managed irrigation systems in the area. The migrants took over the primary management responsibilities of many irrigation systems that were initiated by the **Tharus** and Darais. On the basis of management responsibility, among the 88 irrigation systems inventoried in the area, 20 were found to be managed by original settlers, 45 by migrants and 23 of them managed collectively by original settlers and migrant communities (Shukla et al. 1994).

The Tharus and Darais, theoriginal settlersofthearea, were thepioneersofirrigation development in the valley. Many of the irrigation systems initiated by Tharus before 1953had their origin under the *Pargana* system of governancestarted during the Rana regime⁶. Parganawas agroup of several *maujas* (village) forming an administrative jurisdiction. Each paragana was headed by apargana chaudhary while the mauja was headed by a *Zamindar*. Zamindars were responsible for collection of land revenue from the tenants within the maujas. while the pargana chaudhary was responsible for collection of revenue from the Zamindars. The headquarter of Chitwan that time was Upartang Gadhi, now in Dahakhani VDC⁷. The revenue collected from each pargana was brought to the headquarter by the parganachaudhary. During the period of difficult transport and communication this governance mechanism facilitated the state in revenue collection. Eastern Chitwan that time wasdivided in threeparganans while western Chitwan and Madi valley had oneparganaeach. The pargana chaudhary of each pargana played an important role in the development of the irrigation systems. They used to summon all the tenants in the pargana if labor force of a mauja was inadequate to construct acanal. Jharahi was the formofcompulsory labormobilization from each household, which existed among the Tharu inhabitants as customary institution.

DYNAMISM IN WATER RIGHTS AND CONFLICT RESOLUTION

The Case of Water Adequate FMIS

The case of Surtana, Jivanpur and Badgaon Irrigation Systems illustrate the situation in water adequate regime. While Surtana and Jivanpur Irrigation Systems have only one source, Badgaon Irrigation System has two different sources. The settings of the three irrigation systems is shown in Fig.3. Other characteristics of the irrigation systems arc presented in Table 1. The three irrigation systems were initiated hy the Tharu Zamindars at different periods. Among them Surtana is the oldest while Jivanpur Irrigation System is if relatively more recent origin.

	Badeaon	Jivanpur.	Surtana
Source	Budhi Rapti+Dhongre Khola	Budhi Rapti	Dhongre Khola
Type of Source	Perennial	Perennial	Perennial
Year of initial construction	Budhi Rapti->100 years Dhongre Khola- 1922 A.D.	1958 A.D.	>100 years
Community responsible for initiation	Tharu	Tharu	Tharu
Nature of intake structure	Budhi Rapti-Brushwood Dongre Khola-Gabion	Brushwood	Gabion
Service area	225 bigha	60 bigha	258 bigha
No. of household beneficiaries	167	40	200
Average landholding size	0.5 bigha	0.4 bigha	1.25 bigha
Year of major rehabilitation	1987 (FIWUD)	I988 (FIWUD)	1979 and 1987 (DDC+FIWUD)

Table 1: Physical and Socio-Economic Characteristics of Badgaon, Jivanpur and Surtana Irrigation Systems.



Fig. 3. The Setting of Badgaon, Surtana and Jivanpur Irrigation Systems

Surtana versus Badgaon Irrigation System

Surtana Irrigation System had been obtaining water supply from Dhongre Khola from the beginning. Badgaon had originally built the system with intake in Budhi Rapti which was later abandoned due to deepening of the stream at the point of obstruction. Badgaon at that time was asmallvillageandtheserviceareaofthesystem wasbetween 33 to 40 ha. The labor force available was not adequate to operate the canal with the intake in Budhi Rapti. In **1992**Badgaon users started digging another canal to access the irrigation supply from Dhongre Khola. They built a brushwood type diversion structure upstream of the intake of Surtana. The area that time was under dense forest and the Badgaon users dug the canal day and night through the forest. The people at Surtana could not figure out what was being done until the digging of Badgaon canal was completed and a diversion structure was built.

In **1947**, Surtana users decided to shift the intake upstream of the intake of Badgaon in Dhongre Khola. In aflood in **1954**, Dhongre Kholachangedits courseand entered the maincanal of Surtana. As a result of this event the intake point of Surtana had to be shifted to about **600**m downstream **cf** the original intake point. Once again the intake of Badgaon got to be upstream of the intake of Surtana.

In yet another major flood in the area in 1970 the flood control dike in Lothar river got broken, as a result, a course of Lotharriverentered Dhongre Khola. The intake of Surtana and Badgaon were heavily damaged and it became impossible for Surtana to operate the canal from the same intake. The people of Surtana decided to shift the intake upstream near Shanti Bazar. Since the land near Shanti Bazar belonged to the users of Majhui Irrigation System which had its intake upstream of Surtana, the people of Surtana had to face resistance of Majhui users in obtaining the access to the new intake. For three years from 1970 to 1973 the Surtana canal could not be operated and the farmers could not grow paddy. Surtana users filed a case with the then Zonal Commissioner of Narayani Zone⁸. Later with the intervention of Mr. Him Prasad Upreti, a prominent local leader and the then member of District Council of Chitwan, the dispute was settled and in 1973 Surtana could obtain access by purchasing land adjacent to the intake. This resulted in the shifting of Surtana intake upstream of Badgaon.

In **1979** the District Development Committee (**DDC**)⁹ of Chitwan provided a grant of Rs. **70,000.00** for the construction of a gahion diversion structure at the intake of Surtana. While the work was being planned, the users of Badgaon filed a written petition with the District Development Committee complaining that construction of gabion diversion structure in Surtana would reduce the quantity of supply at the intake of Badgaon. Another issue of conflict resulted from the location of intake points of Badgaon and Surtana as shown in the cadastral map of the area prepared in **1969**. Since the area was surveyed and mapped before Surtana shifted its intake upstream of Badgaon in **1973**, this became a legal document for Badgaon to justify its position. The issue was settled with the intervention of the District Development Committee (DDC). The agreement between Surtana and Badgaon was written down and signed. The main provision of the agreement was that Surtana would allow one-sixth of the flow in Dhongre Khola at the intake

to pass downstream to be used in Badgaon. When the authors discussed with the farmers of Badgaon their rationale for agreeing on one-sixth of the flow in Dhongre Khola, they expressed the following view:

"DhongreKhola is such a source that if you obstruct the stream at any point almost the same quantity of water reappears a few hundred meters downstream. We objected to the construction α the gabion diversion structure in Sultana, not because this would constrain our supply but to legitimize our claims on the (water) supply in Dhongre Khola".

Badgaon versus Jivanpur Irrigation System

After the Budhi Rapti source of Badgaon was abandoned, the farmers of Fapeni village near the intake filled out the canal alignment and started cultivating. The farmers of Pipra village, which belonged to the Zamindar of Surtana, did not have access to irrigation and therefore they could not cultivate rice. In the absence of irrigation the tenants did not have incentive to settle in the village. The Zamindar of Sunana had matrimonial relations with the Zamindar of Kathar village. Kathar village had it's own irrigation system with intake in Dhongre Khola upstream of Majhui Irrigation System. The excess water from the irrigated areas of Kathar drained into Budhi Rapti near the abandoned intake of Badgaon. The Zamindar of Kathar was willing to provide drainage water to Piprabuttherewereonlyfew tenantsin Pipra who were in a position tomobilize the required labor to dig a canal to access this water. The possibility for them was to negotiate with Badgaon to use the old canal alignment dug for Budhi Rapti intake. In 1965the Zamindars of Surtana and Badgaon came to an agreement to allow Pipra to use the old canal to access drainage water of Kathar. The agreement was facilitated by the Zamindar of Kathar and the then Chairman of Kathar VDC, Mr. Him Prasad Upreti. Upon this agreement Pipra started obtaining drainage water from Kathar and Badgaon Irrigation System was renamed **as** Badgaon-Pipra Irrigation System. In the mean time Jivanpur Irrigation System wasconstructed in 1958 within take in Budhi Rapti near the abandoned intake of Badgaon.

After the **flood** damage to the Dhongre Khola intake in 1970, the Badgaon users needed **an** alternative source of water supply. Though they had access to drainage water of Kathar, it was not adequate to meet their demand. The Zamindar of Jivanpur, **Mr**. Chuda Mani Chaudhary, was also the chairman of Kathar VDC. The users of Badgaon decided to approach Mr. Chuda Mani Chaudhary to obtain access to Budhi Rapti source. Considering the sufferings of the farmers of Badgaon and Pipra. Mr. Chaudhary granted them access to Budhi Rapti on the ground that Badgaon-Pipra would allow the drainage water of Kathar to augment the supply of Budhi Rapti. Upon getting access to Budhi Rapti, Badgaon-Pipra started using both, the drainage water of Kathar **as** well as water from Budhi Rapti source. Further, the Badgaon-Pipra canal at the intake was passing through lowland while Jivanpur canal waspassing through upland. Due to topographical disadvantage water in Jivanpur canal would enter only after impounding of water and sufficient rise of water head at the intake. **As** a result more water was flowing towards Badgaon-Pipra to use only one source. They filed a written complaint with the Kathar VDC to settle the dispute. The dispute was

settled with the intervention of Mr. Chuda Mani Chaudhary. Badgaon-Pipra was allowed to use one-fourth of the water in Budhi Rapti and the drainage water of Kathar. A written agreement was reached between Badgaon-Pipra and Jivanpur to this effect in 1972.

Despite the agreement that had put restriction on the access of Badgaon-Pipra to Budhi Rapti source, theactual supply in thesystem wasmorethan to Jivanpur due to the alignment of the canal. In 1987, the Farm Irrigation and Water Utilization Division (FIWUD)¹⁰ provided assistance to Kathar Irrigation System for system rehabilitation, The fanners of Fapeni, who did not have access to irrigation, joined the users of Kathar in resourcemobilization. Upon the intervention of FIWUD the drainage water of Kathar, which was earlier recycled for irrigation in Badgaon-Pipra, was diverted to irrigate areas of Fapeni village and some upland areas of Kathar that did not have access to irrigation. When the farmers of Badgaon-Pipra objected to this intervention, they were convinced by the FIWUD engineer that FIWUD would provide assistance to Badgaon-Pipra in rehabilitation of their system.

In the mean time users of Badgaon-Pipra increased the cross-section of the canal to access more water from Budhi Rapti. In 1992 the users of Jivanpur decided to put a hume pipe culvert at the intake of Badgaon-Pipra *to* limit their access *to* Budhi Rapti water. This was unacceptable to the users of Badgaon-Pipra *so* they broke the pipe culvert at the intake. This raised a serious dispute between Jivanpur and Badgaon-Pipra. The users of Jivanpur filed a written petition with the Kathar VDC. The dispute was settled with the intervention of **Mr**. Shyam Upreti, who was chairman of Kathar VDC. **A** written agreement was reached between Badgaon-Pipra and Jivanpur statingthat (i) Jivanpur wouldget two-third and Badgaon-Pipra one-third of the water at theintake in Budhi Rapti, (ii) all theresources for the subsequent repair andmaintenanceof theintake would be jointly mobilized by the users of both the systems, and (iii) that if government agencies decide to provide support **for** the construction of permanent intake the required resource would be mobilized **by** both the systems proportional to the area under irrigation.

FIWUD provided support to Badgaon-Pipra in rehabilitation of the system in 1987. **A** grant of Rs. 60,000 was provided by FIWUD and resources equivalent of Rs. 15,000 in terms of cash and labor were mobilized by the **users**, which was utilized in the construction of a gabion intake at Dhongre Khola and in the improvement of water distribution structures. Since Dhongre Khola intake of Badgaon-Pipra was functional. the users agreed to one-third of the water of Budhi Rapti while negotiating with Jivanpur in 1992.

In **a** major flood in the Rapti river in 1993 the joint intake of Jivanpur and Badgaon was washed away and a course of Budhi Rapti entered Dhongre Khola from this point. After the flood, interim support was provided by ERIP for the rehabilitation of irrigation systems in the area. Badgaon-Pipra and Jivanpur could temporarily rehabilitate the system for operation. Once again the dispute for water share at the intake in Budhi Rapti arose. Both the systems have been identified for rehabilitation works could not be started. Badgaon-Pipra had been claiming more water at the intake on theground thatthere is more area under irrigation in Badgaon-Piprathan Jivanpur. While Jivanpur had been stating its position as per the written agreement of 1992 that had granted them access to two-third of the water in Budhi Rapti.

In December **1995**, ERIP issued a written notice to both Badgaon-Pipra and Jivanpur to settle their dispute of water share at Budhi Rapti intake or else the proposed rehabilitation support would be cancelled. Both the systems have come to an agreement with the intervention of Kathar VDC on the following clauses: (i) that Jivanpur and Badgaon would agree to share half of the water each at the intake provided a permanent diversion structure be built at the intake, (ii) the resources required to be mobilized internally for the construction of permanent intake would be proportional to service area of both the systems, and (iii) that for subsequent repair and maintenance of the intake the resources would be mobilized equally by both the systems.

Though the dispute between Badgaon-Pipra and Jivanpur is settled some disagreements still persist. One of the issues concerns the nature of the permanent intake. Both the systems have been demanding cement-concrete diversion structure while the engineers of ERIP have been proposing a gabion box type overflow weir. ERIP has adopted the policy of not supporting the construction of cement-concrete diversion structure as it could reduce the available supply to the downstream system and become a source of potential conflict.

The Case of Water Deficit FMIS

To illustrate the situation in water deficit regime, a case study of Pampa, Chipleti and Cyampa irrigation systems is presented. The source of supply of the three systems is Pampa Khola which is a seasonal stream. The people in the area reported that the dry season flow in Pampa Khola has been decreasing. During flash flood, the stream brings massive amount of coarse sediments including sand, boulders and pebbles, as a result of this the bed level of Pampa Khola has been rising. This fact as well as deforestation and uncontrolled land clearing in the catchment area have resulted in changes in the hydrology of this stream. The locations of the three irrigation systems included in this casestudy are shown in Fig. **4.** Among the threesystems, Pampa is the oldest. Other characteristics of the three systems are presented in Table 2.

The areas of the three systems are among the recently settled areas in Chitwan Valley. In 1961exarmymen who were earlier settled across the Rapti river were brought to settle in this area, because the land of their earlier settlement was acquired by the Royal Chitwan National Park. During that time the forest in this area was being cleared by the Timber Corporation. During the Royal visit of the king to Bharatpur, theex-armymen requested bim to grant them permission to use tree roots and other leftover timbers. They were granted Royal permission to utilize the leftover forest productsin 1067haofland. They soldfirewoodandotherforestproductsfronthis area and raised a fund of Rs. 1.5 million. They utilized this money to support development work in the area including construction of roads, schools, drinking water supply schemes and irrigation systems. Initial funding for the construction of Pampa, Chipleti and Cyampa Irrigation Systems came from this ex-armymen fund.

Next >>

	Pampa	Chipleti	Chympa
Source	Pampa Khola	Pampa Khola	Pampa Khola
Type of source	Seasonal	Seasonal	Seasonal
Year of initial construction	1967	1971	1969
Community responsible for initiation	Migrant	Migrant	Migrant
Nature of intake	Permanent (Gabion bos)	Brushwood	Brushwood+ Gabion
Service area	105 bighas	217 bighas	135 bighas
No. of household beneficiaries	96	201	55
Year of major rehabilitation	1991 (CSIP/ADB-N)	1981	None

Table 11: Physical and Socio-Economic Characteristics of Pampa, Chipleti and Cyampa Irrigation Systems.

Origin of Pampa, Chipleti and Cyampa Irrigation Systems

Budi Kulo¹¹, Pakakdibas Kulo and Badara Kulo were developed by the Tharus and existed in the area prior to the initiation of Pampa, Chipleti and Cyampa Irrigation Systems. In 1967 the exarmymen fund provided Rs. 40,000 for the construction of Pampa Irrigation System. The grant was utilized in contracting out the work of canal construction in the difficult portions and in the construction of intake. And all the ex-armymen settled in the area provided free labor in digging the canal. In 1969 a brushwood diversion structure was built in Pampa Khola, about 50 m downstream of present intake and water supply was obtained to irrigate 20 ha of land. In 1970the intake was shifted upstream of the original intake but it was again washed away in a flood. In 1976 the users decided to dig a tunnel through hard rocks and they shifted the intake further upstream. The next year the users of the system were successful in obtaining a grant from the Community Surface Irrigation Program (C\$IP)¹² of the Agricultural Development Bank (ADB/N) which was utilized in the construction of percent was the grant of the government, 30% was provided by ADB/N as credit and 10 percent equivalent of labor was mobilized by the beneficiaries. The service area of the system increased to 70 ha after the improvement under the CSIP program.



Fig.4. The Setting of Pumpa, Chipleti and Cyampa Irrigation Systems

Chipleti Irrigation System was initiated in 1971 with the intake in Pampa Khola, upstream of the earlier intake of Pampa Irrigation System but the system could not be operated for three years. In 1973 a new intake was built in Kali Khola to augment the water supply. Free labor was mobilized by the users of the system and a grant of **Rs. 90,000** from the ex-armymen fund was utilized in contracting out the work of digging the canal in difficult portions. These two attempts were not very successful and the system remained defunct from 1973 to 1981. The fanners in Chipleti were growing maize and millet while in the fanners in the adjoining Pampa Irrigation System were growing rice which was amatter of humiliation for the users of Chipleti. In 1981 an ex-annyman, **Mr**. Chuda Bahadur Pandey, who had training in the engineering division of the Indian Army, reinitiated the construction of the system. It took 44 days for 86 men to reconstruct the system. The system could be operated to bring 48 ha of land under irrigation. Three years later the District Development Committee the provided a grant of **Rs.** 12,000and 11 units of gabion boxes for the rehabilitation of the system.

After the construction of the permanent intake of the Pampa Irrigation System the supply of water at the Chipleti intake was reduced. Though Chipleti had another intake in Kali Khola, the available supply was not adequate to meet the demand for water.

A few Chepang households were irrigating about **5** ha of land from a small canal called Jiudi Kulo with intake in Jethar Khola, upstream of Pampa and Chipleti Irrigation Systems. The drainage of this system was utilized **by** Chipleti for irrigation. To improve the canal and intake in Jethar Khola, the Chepang households obtained a credit support of Rs. 9,000 from the Small Farmers Development Project (SFDP) of ADB/N. In the mean timeanunderground water tank for drinking watersupply scheme was built on the bank of Jethar Khola which reduced the flow in Jethar Khola. The Chepang households decided to move their intake upstream in Pampa Khola in **1978**. As a result of this change the water supply in Jiudi canal increased tremendously.

From **1985** onwards, the users of Chipleti Irrigation System obtained water for dry season irrigation upon request to the Chepang households. The **users** of Chipleti had realized the importance of this water because it was valuable for their wheat irrigation. In **1990** an agreement was reached between the **users** of Chipleti and the Chepang households that resulted in regular access of Chipleti to Jiudi Kulo. In turn the users of Chipleti paid **Rs**. 20,000 to the Chepang households which they utilized to pay back the loan from SFDP. After this agreement the Chepang households became regular users of the combined Jiudi-Chipleti Irrigation System.

Cyampa Irrigation System was initiated in **1969.** During the construction of the Pampa Irrigation System in **1967** the users of Cyampa had also contributed cash and labor hut upon completion of the construction, they were deniedaccess to irrigation. Shanta Bahadur Thapa, aprominent fanner from the area, decided to invest his own money to construct Cyampa Irrigation System. In **1969** heinvested a sum of Rs. 12,000 and the users of Cyampa contributed free labor fortheconstruction of the canal. It took nearly one month for **45** men to dig the canal and construct an intake in Pampa Khola. Water supply was obtained for irrigation of **53** ha of land in the command area of the Cyampa Irrigation System. In **1970**the ex-annymen fund provided **a** grant of **Rs.6**,000 which was

utilized to partlay reimburse the expenses of Mr. Thapa. The system waslaterexpanded to irrigate 90 ha of land.

Pampa versus Chipleti Irrigation System

In 1971 when the initial construction of Chipleti Irrigation System took place. its intake was upstream of Pampa Irrigation System. Pampa moved its intake upstream in search of relatively more stable intake point. In 1991 when ADB/N provided rehabilitation support to Pampa, the major portion of resources was spent in the construction of the intake structure. The objective was to divert maximum possible amount of water **from** Pampa Khola.

Though Chipleti had two intake points in Pampa and Kali Khola the available supply was inadequate to meet the demand. The users of Chipleti negotiated with Jiudi Kulo of Chepangs to access more assured water supply.

On the day of July 7, 1992 when the new intake of Pampa Irrigation System was inaugurated, the users of Pampa organized a feast at the intake. Duringthefeast the users of Pampa decided to break the upstream intake of Jiudi-Chipleti system. The position of Pampa was that with the access of Chipleti in Jiudi Kulo the demand of water would increase which would reduce the supply at the intake of Pampa Irrigation System.

When the intake of Jiudi-Chipleti was damaged, the users of this system were transplanting monsoon rice. As the water supply in the canal ceased, the users went to the intake and found the intake broken. The users committee of the Jiudi- Chipleti sent a written message to the users committee of Pampa to enquire into the matter. When they got no response a written complaint was filed in the Birendranagar VDC asking for compensation of **Rs**. 52,820 for four days of delay in transplanting rice due to the destruction of the intake. The VDC functionaries couldnot arbitrate in the matter and referred the case to the District Administration Office at Bbaratpur. The District Administration Office organized several hearings from both the parties. While the case was still pending at the District Administration Office, the users of Pampa filed a petition at the District Court of Chitwan on the grounds that the construction of Jiudi Kulo was initiated after the construction of Pampa and therefore it would reduce the prior rights of Pampa Irrigation System in Pampa Khola.

On June 17, 1994 the District Court gave the verdict in favor of Pampa Irrigation System. The verdict of the court stated that **until** 1978 the intake of Jiudi Kulo was from Jethar Khola and that it was moved to Pampa Khola only after 1978. Since this change was made after the construction of intake of Pampa Irrigation System, it may reduce the supply available for Pampa Irrigation System in Pampa Khola.

The users of Jiudi-Chipleti Irrigation System challenged the verdict of the District Court in the Appellate Court in Hetauda where the verdict was in favor of Jiudi-Chipleti Irrigation System. The

new verdict stated that the existing intake of Jiudi Kulo is **1.5**km upstream of the intake of Pampa, sotheissueraised by Pampathatit would reduce the supply in Pampa Khola at the intake of Pampa Irrigation System is not justifiable. The case has been appealed in the Supreme Court,

Pampa versus Cyampa Irrigation System

During the initial construction of Pampa Irrigation System in 1967, the present users of Cyampa Irrigation System had also contributed cash and labor hut they were denied access to irrigation from this system. They then began to construct Cyampa Irrigation System, locating its intake downstream of Pampa Irrigation System.

The conflict between Pampa and Cyampa irrigation systems arose when the construction of a permanent intake structure was initiated in Pampa Irrigation System in 1991 under ADB/N's support. Until that time Pampa Irrigation System had brushwood diversion structure at the intake. While the construction of the new intake was going on, the users of Cyampa filed a written complaint with the Birendranagar VDC and District Administration Office in Bharatpur. When the authors enquired into the rationale of their complaint, they stated

"Wesaw cement concrete diversion structure being built with almost 6 feet deepfoundation. A structure of this nature was sure to reduce our share of water in Pampa Khola".

The Birendranagar VDC involved the officials of ADB/N's Small Farmers Development Project in Birendranagarin thearhitration. Anagreement, which was writtendown, was reached on March **10**, 1992. As per the agreement, gabion boxes would be used instead of concrete to construct the diversion structure at the intake and Pampa Imgation System would provide water *to* Cyampa to irrigate wheat crops. Since then if water is needed in the Cyampa Irrigation System, the users' commitee apply in writing to Pampa, stating the area to be irrigated and the actual imgation time required. The users' committee of Pampa validate the request of Cyampa through actual inspection. If the request is found genuine, Cyampa is given water for irrigation. When the users of Cyampa were enquired about this arrangement they stated that the supply made available by Pampa was never adequate.

SUMMARY AND CONCLUSION

This paper started with a brief conceptual framework of irrigation development as property creating process, the process of defining and realizing claims on irrigation and therefore the emergence of water rights. The later part **of** the paper dealt with a historical account of irrigation development in east Chitwan that laid the context for initiation of FMIS in the area. *To* illustrate the dynamism of water rights and conflict resolution mechanisms, two sets of case studies of FMIS, representing water deficit and water **surplus** conditions, were used. The two sets of cases

illustrated the processes of negotiation, re-negotiation, claims and conflicts in acquisition and sharing of water that occur as a result of changes, whether internally induced or resulting from external forces. The external forces in the context of the study area were Occurrence of flood, change in the flow regimes of the streams and structural changes in the nature of diversion structurescaused by external intervention. The internal forces were increase in population and area under cultivation which increased demand for irrigation. From the two sets of cases, conflicts emerging from the claims on irrigation as well as the hierarchy of institutions and mechanisms existing for arbitration on conflicts were identified.

The resettlement program in the area was initiated in 1953 under the Rapti Valley Development Project. **As** the population increased the demand for irrigated agriculture also increased. People started building new irrigation systems to exploit the existing water resources. At the same time, the need for expansion of irrigated area of existing systems also increased. This induced constraints on existing water resources as well as on water supply within the system. When the magnitude of constraints increased such that the benefits the users were enjoying were adversely affected, they started making efforts to define, establish and protecttheirrights. Whileestablishing their rights, several kinds of differentiation and amalgamation took place. The magnitude of constraints were further enlarged **by** the occurrence of floods and reduction in dependable flow regime in the streams. In attempts to ease the constraints, changes were brought in the physical and structural characteristics of irrigation systems. Traditional brushwood diversion structures were replaced by gabion box intake structures. Such changes further resulted in changes in the relationship between upstream and downstream irrigation systems as regards access to water.

Conflicts emerged when the attempts to protect rights in one system were found to put limits on the benefits realized by others. This is apparent form the case of Pampa, Chipleti and Cyampa irrigation systems where construction of permanent intake structure in Pampa irrigation system became a source of conflict. The conflict between Badgaon and Jivanpur and that between Pampa and Chipleti was due to the attempts made to expand access to the water source. Attempts to gain access to upstream intakes were also made through negotiation with the upstream systems. The amalgamation of Jiudi with Chipleti Kulo was aresult of the attempt to expand access to upstream system.

The two sets of cases of FMIS also illustrated the hierarchy of mechanisms that exist for arbitration and mediation of conflicts. There are multiple levels of informal mechanisms before **people** seek the intervention of formal legal and quasi-legal institutions. The initial attempts for arbitration was found to take place among the users. As apparent from the case of Pampa and Chipleti irrigation systems, the users of Chipleti attempted to seek explanation from Pampa when their intake was damaged. The second stage of mediation was found to take place with the involvement of prominent individuals in the community, who may be either village elders or leaders of local political units. The role of local feudal like Zarnindars who initiated the **FMIS** have also been important. The conflict between Surtana and Majhui irrigation systems and that between Badgaon and Jivanpur were settled with the help of such individuals. People seek the intervention of legal and quasi-legal institutions only when the informal conflict resolution mechanisms fail. The role of the Village Development Committee (VDC) has been important as a quasi-legal institution in resolution of irrigation related conflicts. The VDC Act of 1991 has empowered the VDC to look into the matters of irrigation development and resolution of irrigation related conflicts. The VDC has authority to mediate between conflicting parties and impose fines and penalties in case of defaults.

In case of conflicts not getting settled at the VDC level, they were found to be referred to the District Administration Office. This was observed in case of Pampa and Jiudi-Chipleti irrigation systems where the Birendranagar VDC referred the case to the District Administration Office in Chitwan when the conflict could not be resolved at the VDC level. The intervention of court in conflict resolution was sought as a last resort. The conflict of Jiudi-Chipleti and Pampa irrigation systems was brought to the court only because other mechanisms for conflict resolution. including the VDC and the District Administration Office, failed to resolve the conflict adequately.

The two set of cases presented in this paper limited the explanation to dynamics in the water rights only at the source and ignored the issues resulting from individuals' claims within the system. The authors plan to extend the study further and document the processes of realizing waterrights within the system.

IMPLICATIONS AND POLICY ISSUES

One of the important inference drawn from the two sets of cases is that water right is a continuous flux changing over time because of continuous processes at work. There are multiple dimensions to water rights. Even drainage water from the upstream system could be the potential source of supply for the downstream systems. This has implication for the development and management of *irrigation* resources. Therelationshipamong theirrigation systems in terms of their rights at the source, if ignored during external intervention, may result in conflicts. Thus, while planning intervention in the irrigation systems, existing access to different sources and the inter-system watertransfermust be accounted *for and* the possible effects of intervention on existing rightsmust be assessed in advance.

Another issue relates to the ecological forces responsible for water right dynamism at a macro level. Particular to the cases described in this paper, occurrence of floods and changes in the dependable flow regimes of the streams have influence on the existing water rights. The causes of these forces and therefore the means of their control, lie outside the boundary of the irrigation systems, hence multi-sectoral approach in catchment protection, forest conservation, erosion control, flood protection and river training is required.

NOTES

- I Paper presented at the Conference on Water Rights, Conflict and Policy, January 22-24, 1996. Kathmandu, Nepal.
- 2 The authors are Faculty and Members of Irrigation Management Systems Study Group at the Institute of Agriculture and Animal Science (IAAS). Rampur, Chitwan. Nepal.
- 3 Khola in Nepali means river or stream.
- 4 Irrigation Management Systems Study Group (IMSSG) is a professional group of faculties at the Institute of Agriculture and Animal Science (IAAS) involved in the study of issues related to irrigation development and management.
- 5 East Rapti Irrigation Project (ERIP) is a public sector irrigation development program. being implemented in east Chitwan under credit assistance of Asian Development Bank. The objectives of the project are: i) rehabilitation of farmer managed irrigation systems in the project area. ii) construction flood control dike and river training in Rapti river, iii) construction of approximately 60 kmof village and link roads and iv) promotion of shallow tube well program in the areas where surface irrigation is not available.
- 6 Rana regime was established by Prime Minister Jang Bahadur in **1846** A.D. The Rana families ruled Nepal during most of 19th and first half of 20th century.
- 7 Village Development Committee (VDC) is an elected body at the village level.
- 8 Nepal is divided into 14 Zones and 75 Districts; each district forms one administrative boundary.
- 9 District Development Committee (DDC) is an elected body at the District level.
- 10 The Farm Irrigation and Water Utilization Division (FIWUD) was started in 1973 under the Department of Agriculture to take up construction of irrigation schemes less than 500 ha in Terai and less than 50 ha in the hills. In 1987FIWUD was merged with the Department of Irrigation.
- 11 Kulo in Nepali means irrigation canal or irrigation system.
- 12 The Community Surface Irrigation Program (CSIP) is the credit and subsidy based surface irrigation development program of the Agricultural Development Bank of Nepal (ADB/N). Of the total cost of **an** irrigation project, 60% subsidy in the capital cost is provided by the government, 30% is provided by ADBN as credit and 10% equivalent is home by the beneficiaries through compulsory labor mobilization.

REFERENCES

Coward E. W. Jr. 1983. "Property in Action". Paper Presented at Khon Kaen University, Thailand.

F'radhan U. 1987. "Property Perspective in the Evolution of a Hill Irrigation System: A Case from Western Nepal". In, *Irrigation Management in Nepal: Research Papers* from a National Seminar. Kathmandu: IIMI/IAAS/Winrock.

Ambler J. S. 1989. "The Influence of Fanner Water Rights on the Design of Water Proportioning Devices." In, *Design* Issues *in Farmer-Managed Irrigation Systems*. Proceedings of the International Workshop on the Fanner Managed Irrigation Systems Network, Chiang Mai, Thailand.

Shukla A. K., K. P. Gajurel and G. Shivakoti. 1994. "Use of Inventory Methods for Policy Input: Experience from Irrigation Resource Inventory of East Chitwan". In, Sowerine, J. G. Shivakoti, U. Pradhan, A. Shukla and E. Ostrom (eds.), From Farmers Fields to Data Fields and Back: A Synthesis of Participatory Information Systems for Irrigation and Other Resources. Kathmandu: IIMI/IAAS.