



## EQUITABLE DISTRIBUTION AND COMMON RESOURCES MANAGEMENT AT ANDHI KHOLA IRRIGATION SYSTEM

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### ABSTRACT

Water resources being one of the major natural resources of Nepal, culturally, economically as well as geographically it plays an integral and vital role in the agriculture based economy that supports 40% of the GDP with more than 80% people's involvement in the sector. Land fragmentation coupled with small land holdings, and uncertainties in land tenure regulations are identified as some of the confronting factors in the process of agriculture development in the country.

Land pulling from the larger landholders with their consent and distribution of land in accordance with the water right shares earned during the construction of the irrigation project has addressed the poverty to a larger extent and the effort made by Andhi Khola Water User's Association (AKWUA) is commendable. This indigenous practice of water right provided an opportunity to even the land less family of the command area to earn land by contributing labor during the construction of the project. This indigenous practice has provided land to the 15 landless and 56 marginal farmers' family.

The water right shareholders can even sell their share of water to the person in need with in the command area. The out come of the strategic management and implementation of this irrigation project has not only resulted in the decrease of migration but it has improved the economic condition of the people. Increase in the crop production and economic activities has attracted establishment of boarding schools and mills for grain processing. The water from the Andhi khola Irrigation system has not only been used for irrigation but it is used in multiple purposes. This system is a unique model of the integrated water resources management and has been successful to address the poverty with in the command area.

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## **PART I**

### **INTRODUCTION**

Although UMN had been planning a water resources development program in the Andhi-khola basin (Andhi is the name of the river and Khola means river in Nepalese language) since 1963, it could not be materialized till 1980 due to lack of resources both financial and humane. In 1980, it exerted its effort to undertake a multipurpose and integrated rural development project targeted for overall development of the region. Under this project, a 5.1 MW hydro-electric project was formulated with the objective of availing electricity for rural electrification, ropeways, lift irrigation and small agro-based industries.

In 1981, an agreement was signed between the then His Majesty's Government of Nepal and the UMN for the implementation of the program. Initially, the Norwegian Agency for Development Cooperation (NORAD) provided the fund through UMN for hydro-power construction and rural electrification component only. Later following a request, the NORAD agreed to provide additional fund needed for irrigation development activities too. In 1985, the NORAD through Norwegian Himal-Asia Mission made available the fund for irrigation component. This irrigation project is called Andhikhola Irrigation Project (AKIP) that provides irrigation facility to about 282 hectares of lands. The total cost of the project at its completion was 31.8 million rupees (US \$ 0.45 million). This paper now onwards will focus only on the different aspects of Irrigation development and related impacts on the socio-economic condition and its functioning mechanisms.

### **THE ANDHI KHOLA IRRIGATION PROJECT**

#### **THE WATER SOURCE**

The arrangement for the distribution of water for both hydropower and irrigation is made in such a way that a 60 m. long and 6 m. high Ogee type weir is constructed across the Andhi-kholal that in turn diverts water through 1284 m long head race tunnel that opens up to a surge tank. This surge tank has two out lets one for the hydropower and another for the irrigation channel.

#### **THE IRRIGATION SYSTEM**

This irrigation system comprises of 9.4 km of main canals (3.4 km extended after hand over), 13 branch canals totaling to a length of 21.6 km with a network of pipelines to cater irrigation water to different patches of agricultural lands scattered around the sloping and incised topography. The construction of this system was started in 1989 and handed over to the water users organization, Andhi Khola Water Users Association (AKWUA) on 27<sup>th</sup> June, 1997.

## **FORMATION OF ANDHI KHOLA WATER USERS ASSOCIATION (AKWUA)**

In line with one of the prominent objectives of the project, which was the uplifting of the poor and landless farmers in the command area through active participation in the development of the project a representative body of the affected farmers was formed as early as in 1984 and registered under the association registration act. There are three committees under AKWUA that are legally tied up with the AKWUA statute. Their major responsibilities and extent of works are described below:

### **1. AKWUA EXECUTIVE BOARD:**

This board is comprised of 13 members with at least 33% of women members. This board is chosen through the direct election from the share holders. The election is held every year, however, the each election replaces only the 50% of the members that have completed 2 years tenure. This arrangement is made in order to make cohesion with the newly elected members and make sustainable governance. The executive body is not only responsible for the daily activities of the AKWUA office and its employees at the same time, it is the main body that looks after the over all operation and maintenance, service fee collection, budget allocation, water distribution and resource mobilization within the system. This committee is mandated to take all the major decisions and is responsible to make cooperation and coordination with the major stakeholders and funding agencies both governmental and non-governmental. Regular monthly meeting is held of the executive body.

### **2. EVALUATION AND MONITORING COMMITTEE**

This committee is comprised of one chairperson and 10 members elected directly from the share holders. The election for this committee is held every year for its all 11 members. This committee is mandated to monitor and evaluate the activities carried out by the executive committee and make suggestions and recommends for further betterment. This committee submits the report of its evolution and findings to the executive board every six months.

### **3. LAND PURCHASING AND REDISTRIBUTION COMMITTEE**

This committee is comprised of one chairperson and 6 members. All the 6 members and the chairperson are nominated by the executive body. This committee is mandated to keep the records of the land and water share of the individual. The trading of the water share can only take place after the recommendation of this committee to the executive body.

## **FORMATION OF ANDHIKHOLA MULTIPURPOSE ASSOCIATION (AMA)**

With the main objective of providing sustainable support to AKWUA a new organization in 2005 has been registered. This organization is comprised of AKIP shareholders and representative from Butwal power Company (BPC) that owns the hydropower. This organization has 500 general members. It also has an executive body comprised of 5 elected members out of water shareholders and 2 representative

nominated by BPC. BPC has agreed to provide Rs. 250000.00 per annum to AKWUA through this organization for institutional development of AKWUA. After formation of this organization BPC has waived the share of the cost (20%) that AKWUA used to pay to BPC towards the maintenance to head works and headrace tunnel. This organization is active in attracting fund from donors. So far the fund collected by this organization amounts to rupees 577774. It releases the fund to AKWUA as and when requested.

### **ROLE PLAYED BY THE AKWUA AND MODALITY OF IMPLEMENTATION**

The AKWUA has worked closely with AKP/ UMN staff in implementation of the irrigation project. It has been much instrumental specifically in mobilizing local human resources during construction, and executing necessary task of land purchasing and redistribution program of the project. Fig. 1 presents the external and internal support mechanism that the AKWUA has established. Some of the prominent areas wherein the AKWUA has contributed are discussed below:

#### **SHARE EARNING:**

As stated earlier, any person residing in project area could earn a share by contributing 5 days labor contribution (worth Rupees 165 equivalent to US \$ 2.32). A person was entitled to earn a maximum of 4 shares. There was a provision of 25000 shares to be distributed to the beneficiaries. Possession of the single share would give the owner a water right of 1/ 25000 part of the water flow available at the head (which would mean 688 lit/sec divided by 25000, equals to 0.027 lit/sec). Calculating at the rate of Rupees 165 per share the total contribution that was expected from the beneficiaries farmers was worth rupees 4,125,000. However, by the end of the project i.e. hand over date the shares earned by the beneficiaries were only 17739 worth rupees 2926935. Since the UMN had spent money in lieu of labors for rest of the contribution the UMN kept rest of shares, 7,261 within it self. However, in year 2000 the share kept by UMN was handed over to the AKWUA. So far AKWUA has sold 1056 shares out of 7261 and remaining 6205 shares are still in the possession of AKWUA. In order to sell the remaining share AKWUA is thinking of revising the quantity of water per share.

#### **ASSESSMENT OF WATER NEED**

The AKWUA notifies to the user farmers register their shares with in certain date before each cropping season. They share holders are required to mention the canal from where he /she needs water. Based on such registration, the AKWUA calculates the discharge needed and it requests the Hydro power to release water for irrigation from the surge tank. The AKWUA also determines the discharge required to each canal (Main, branches and tertiary) based on the prior registration.

#### **LAND RE-DISTRIBUTION**

One of the major objectives of this project was to collect some lands from the rich farmers and then distribute to the land less. The basis for determining and optimum land requirement for livelihood was based on the assumption (postulated by Joy Poppe,

1982, Socio-Economic Survey) that a family with 7 members would need a land area of 5 Ropani (0.25 hectares). This would mean that one person would need approximately 11.5 anna (0.036 hectares). As a result of this, the project made criteria that farmers having more than 0.036 hectares per person would require to sell 10% of their extra land to the AKWUA. Such purchased land pieces would then be distributed to the poor or landless farmers at the same pre irrigation price.

To date, AKWUA has been successful to purchase 232 Ropani (11.6 hectares) of land and also has already distributed this land to 71 poor/landless and marginal farmers. The rate for buying and selling of the land by the AKWUA was decided according to land category which is shown in table 1. While the money was fully paid to the seller, the eligible buyers were allowed to pay in installment basis of five years with out any interest. For this purpose of land pulling and subsequent payment to the seller, UMN had provided a refundable fund to the AKWUA which later on waved by the UMN to the AKWUA for its institutional development.

**Table: 1.** Land Price

S.No.	Price (Rupees/ropani)		
	Land Slope	Before 1990	After 1990
1	0° - 10 °	2000	3000
2	10° -20°	1800	2800
3	20° - 30°	1600	2600

### **IRRIGATION SERVICE FEE**

Each shareholder or beneficiary farmers are paying rupees 6.0/share/year for office expenditure of AKWUA. Besides this the shareholders are paying rupees 4/share/year for maintenance and operation of the canal system. The shareholders are also shouldering a portion of maintenance expenditure of headwork and tunnel (20%) to the hydropower company. At present 15000 shares are active and utilizing water for irrigation and paying the O& M as well as office expenditures. Besides the above the AKWUA also mobilizes some labor contribution from each shareholder for canal cleaning and reshaping. There are some prior agreed rules and procedures for such labor contribution. Therefore, the canals are generally cleaned twice in a year that is before paddy transplanted and wheat sowing.

### **CONFLICT MANAGEMENT**

The AKWUA board has been successful to resolve conflict so far. There has been no conspicuous related to water allocation and distribution. The AKWUA has rules whereby any person or shareholder who does not abide by the rule are normally penalized by depriving him of irrigation water or requiring him to pay fine of some amount.

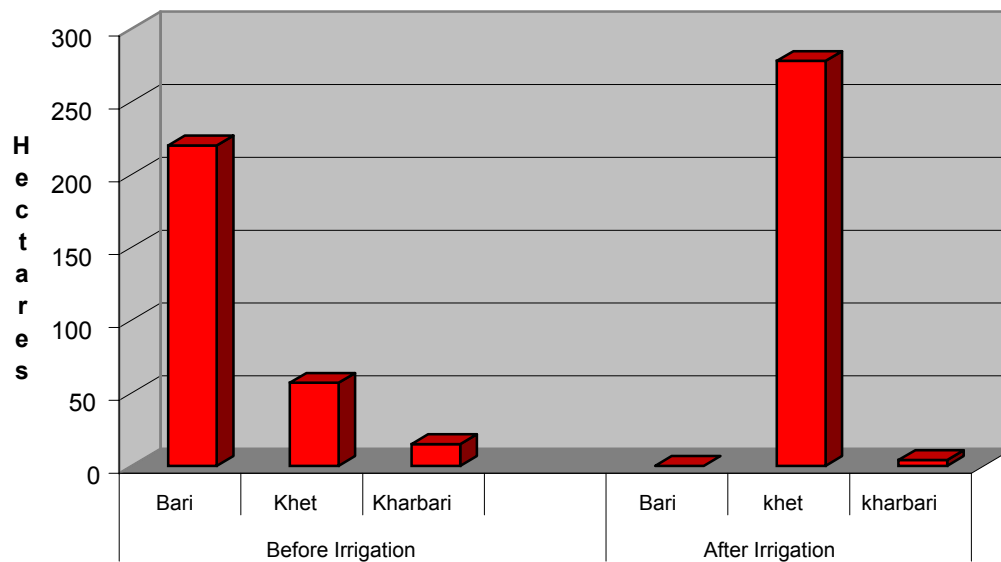
## PART II

### THE COMPARATIVE STUDY

#### LAND TYPE OF THE COMMAND AREA

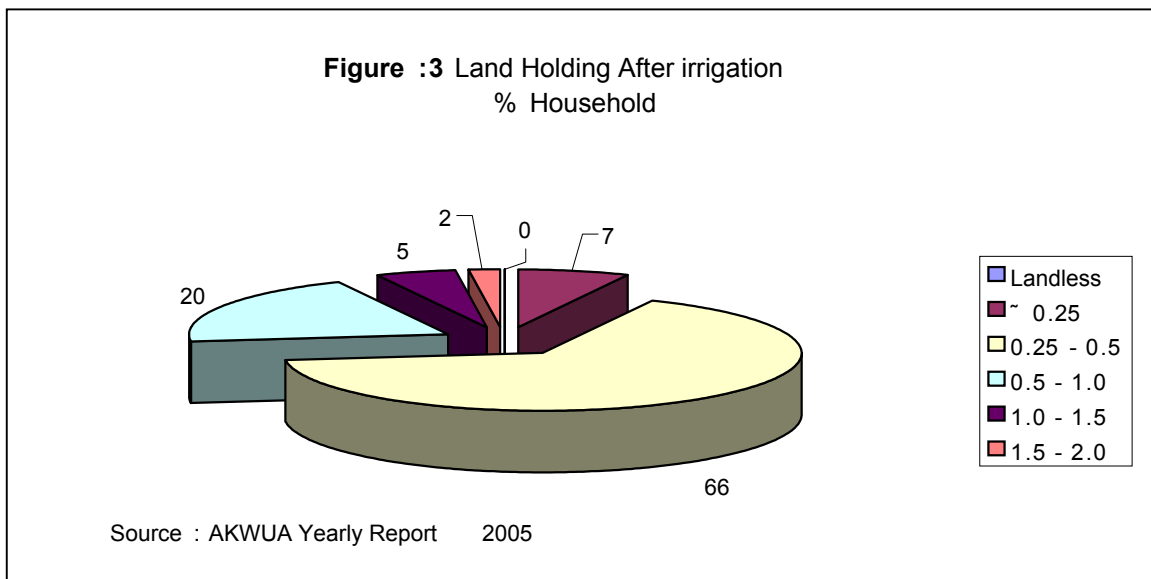
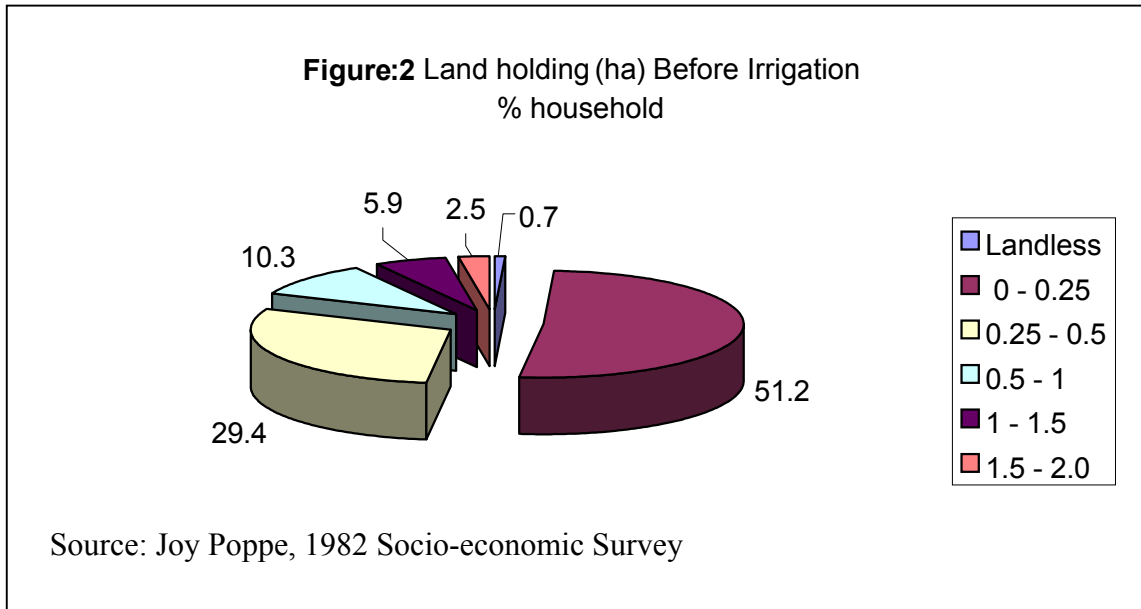
Basically the land in hills is classified into three types- “Khet” – terraced, irrigated land; “Bari” – unirrigated land that is sometimes terraced; “Kharbari” – an area of seemingly waste land which is cut for fodder. The Figure 1, below shows the comparative status of land type with in the command area. It is note worthy that the farmers have worked hard to convert their sloping land into terraced land in order to grow rice and take full advantage of irrigation. This terracing of land has not only added value to their property but also the soil erosion has been checked to a larger extent.

figure :1 Land Type



**LAND HOLDING**

There has been a significant change in the pattern of land holding as a result of land pulling from the larger land holders and redistribution to the land less and marginal farmers. The figure 2 and 3 show the comparative pattern of land holding.



**FOOD SUFFICIENCY STATUS**

Rain fed paddy and maize were the dominant crops grown in the area. After the irrigation facility, farmers are producing more paddy, wheat and the vegetables such as tomatoes, potatoes, cauliflower, cabbage, onion, garlic and green leafy vegetables. Generally, maize and millet are grown in unirrigated “bari” land. After the availability of irrigation, major part of the bari and meadow has been converted into rice fields and thus the production of maize and millets has gone down considerably. More and more

farmers are attracted towards the vegetable farming due to availability of agricultural inputs in the local market and the agriculture extension service nearby. Tables below show the comparative production status of different crops:

#### Comparative Crop production

Before Project		In year 2005	
Crops (Rainfed)	% of Gross Production	Crops (Irrigated)	% of Gross Production
Paddy	38.70	Paddy	60.77
Maize	30.77	Maize	10.90
Millet	16.90	Millet	0.85
Wheat	7.28	Wheat	15.37
Potato/Vegetables	3.16	Potato/Vegetables	9.37
Pulses	2.33	Pulses	1.51
Mustard	0.86	Mustard	1.23

The average grain production per person per annum has increased from 3.83 muri (Approx 268 kg) to 5.64 muri (Approx. 395kg).

#### CROPPING INTENSITY

Due to the non availability of irrigation water only the long duration crops were grown as a result of which, farmers were able to grow only two crops per year. The average cropping intensity then reported was merely 150%. However, due to availability of short duration and quick yielding varieties most of the farmers are harvesting 3 crops a year resulting into the 288.8% of cropping intensity in the year 2005.

#### CROP YIELD

No large increase in crop yield was reported in the earlier years and it is believed that this might have happened due to the loss of fertile top soil while converting the bari (sloping land) into Khet (terraced land). However, in the recent years the average yield of summer paddy is 3.1 mt/ha and spring paddy (cultivated only from last year) is 4.4 mt/ha. The average yields of wheat and maize are 1.8 and 1.5 mt/ha

#### ECOLOGICAL BALANCE

The previously rugged terrain of high slope was prone to land slide and land degradation. Deforestation of the marginal land for fodder and fuel was its peak. However, after up coming of the multipurpose project these adverse activities have been checked to a great extent. Efforts have been made towards plantation of suitable plants to minimize the threat of land slide and sheet flow of top soil. The area that looked deserted before the implementation of the project now surrounds with green vegetation giving a picturesque view. As result of this effort the project has owned the prestigious "Blue planet Award 2005". A good effort towards biodiversity and ecosystem conservation with in the project area has been made to over come the threat of land degradation.



## CONCLUSION

The AKIP is a unique irrigation project in the history of irrigation development in Nepal. The modalities of design and construction, water right share distribution; land pulling and redistribution are very well thought and very appropriate ones. The project has been successful in meeting the objectives up to large extent. The unique concept of share distribution has not only instilled much farmer's contribution in the system construction but has become one of the example of equitable distribution of common resources and its management. It has helped to establish an equitable water distribution mechanism. The major success of this project lies in getting some portion of land from comparatively large land-holders and distribution of these land to land less and marginal farmers. The project has been successful in alleviating the poverty in the region. The trend of migration of the family members from the region has gone down considerably. The establishment of health centre and educational institution has provided the opportunity to the population for better health care and education. The establishment of strong and powerful water user Association is another remarkable achievement of this project towards decision making for the betterment of the farmers and functioning of project as well. This project is not only a very good example of successful integrated water resources management but also a very good coordination and cooperation exists between the management of Irrigation system and Hydropower Company.

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