Fish and shrimp harvests and socio-economic survey in two mangrove areas of Sindh coast, Pakistan

By Abrarul Hasan, 1993

Abstract
In Pakistan, from 1983 to 1986, there was a ban on fishing for shrimps during June and July. Due to political reasons, the ban was lifted in 1987. This situation exacerbated growth overfishing, particularly in the areas of the Indus Delta. Therefore, it was of great interest to estimate fish and shrimp landings at Ibrahim Hyderi and Rehri Goth, and compare the trends of shrimp sale categories with the previous studies at Karachi Fish Harbour. The study also covers the socio-economic aspects of the fishermen communities living at Ibrahim Hyderi and Rehri Goth. This sort of study will be helpful in formulating realistic management advises based on up to date assessments.

For the estimation of shrimp and fish landings a stratified random survey technique was applied. This technique reduces the sampling variance by controlling variability in the parameter being estimated. A heterogenous population is divided into homogenous sub-populations (strata) which are then subjected to simple random sampling. To reduce the sample variance, boats were divided into four categories 1) launches and gillnetters, 2) big boats 3) small boats without ice and 4) small boats with ice. The stratification into four categories has been used to improve the precision of estimates.

The estimated total landings of shrimps at Ibrahim Hyderi from August to December, 1992 were 2945 metric tons. There are three main categories of shrimps, namely Jaira, Kalri and Kiddi. At Ibrahim landing place, the total landings of Jaira by combined categories from August to December were estimated to 475.52 metric tons. The monthly landings of Jaira varied from a maximum of 202.84 metric tons in August to a minimum in November with 18.69 metric tons. The sale category Kalri was estimated to 310.03 metric tons for the same period, with the monthly range from 135.3 metric tons in August to 3.85 metric tons in December. Kiddi was the dominant sale category, with an estimated yield of 2159.29 metric tons. For this category, maximum landing was recorded in October, with an estimated yield of 915.20 metric tons, while landings were low in November and December.

The total landings of edible fish at Ibrahim Hyderi from August to December by combined sale categories were estimated to 1373.84 metric tons. The monthly breakup of fish ranged from a maximum of 451.96 metric tons in August to a minimum in November with 171.49 metric tons. The major groups of fish at Ibrahim Hyderi were seabreams, croakers, eelfish, sharks, catfish, flatfish, ladyfish, mullets, anchovies, snappers, grunts, white pomfrets and mackerels.

Small pelagic fish which are mainly treated as trash fish were also estimated. The maximum landing was recorded in November, with estimated landing of 24612.6 metric tons. Mixed trash fish was also estimated. The maximum landing was recorded in September with an estimated yield of 132.25 metric tons. The minimum was recorded in November.
The estimated total landing of Jaira at Rehri Goth from August to December, 1992 were 111 metric tons. The monthly landings of Jaira at Rehri Goth varied from a maximum of 52.08 metric tons in August to a minimum in December with 3.30 metric tons. The maximum landing of fish at Rehri Goth was recorded in October.

The socio-economic survey of Ibrahim Hyderi and Rehri Goth revealed that the people of Ibrahim Hyderi and Rehri Goth depends on mangrove ecosystem for their subsistence. At Ibrahim Hyderi the total fish consumption as a subsistence was estimated to 40 metric tons.

The analysis of effort and landings of shrimps clearly indicates that the landings of Jaira and Kalri have decreased to a considerable extent in comparison with previous studies. Most probably the stocks of these sale categories are being overexploited in a continuous manner without any restrictions.

**If left unchecked, overfishing to this extent may lead to a stock collapse and ruin of the fishery, because the present stocks, and thus the level of reproduction become affected. Therefore, commercial trawling in the Indus Delta creeks should permanently be forbidden. This will permit the shrimp and fish to utilize their capacity for rapid growth while inhabiting these nursery grounds. Two months of ban on commercial trawling from June to July should be contemplated to protect the recruitment occurring at that time.**

A thesis submitted in partial fulfillment for the award of Master of Science in Management of Natural Resources and Sustainable Agriculture (MNRSA)

Department of International Environment and Development Studies (Noragric), Norwegian University of Life Sciences
Numerical modeling of groundwater recharge rate; Schedule I-B area, Fourth drainage project, Faisalabad, Pakistan

By Iftikhar Hussain Sabir, 1994

Abstract
Estimation of groundwater recharge rate is of vital importance in many questions concerning management and utilization of groundwater resources efficiently and economically. This study was intended to estimate a maximum net recharge rate, needed to compute a drainage coefficient for subsurface pipe drainage systems. A three dimensional numerical groundwater flow model AFPM incorporating finite element method was applied and calibrated for a period of five years (June 1985 to October 1989) with a time step of one season monsoon and non-monsoon, to the aquifer underlying the S-I-B area of FDP.

Input for the model, in addition to the geohydrologic parameters, was element wise various seasonal recharge and discharge rates. Head controlled boundary conditions with known potential at the boundary nodes were employed, and model was calibrated with many combinations of possible hydraulic parameters. The final results gave the best overall fit between model and observed water 'table elevations at the internal nodes. The results of steady state, i.e. calibrated water table elevations of June 1985 were treated initial conditions for further transient state runs.

The model simulated the changes in water table elevations in response to seasonal areal recharges to the groundwater system and calculated the rate of recharge for ten seasons. The maximum net recharge value to the aquifer 0.53 mm/day was for monsoon 1986, and the minimum 0.092 mm/day in monsoon 1989. Statistical and graphical evaluation of model results were conducted and it was concluded that simulated water table elevations were in good agreement with that of field observations. The numerical model suggested, that on regional basis groundwater reservoir was being recharged. It also indicated that during non-monsoons, the period of low recharge and relatively constant abstraction the groundwater levels fall, and then with the start of monsoon tend to level off as more and more contribution from rainfall recharge does occur.

The calculated maximum net recharge value for the model area and on nodal basis were comparable with SGMP results. Then it was recognized that the model in its present form does adequately represent the flow mechanism.

The sensitivity analysis for the aquifer parameters showed that water table elevation calculations were sensitive to hydraulic conductivity values of the aquifer.

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Department of International Environment and Development Studies (Noragric), Norwegian University of Life Sciences
Changes in land use and farming systems in the Northern Areas of Pakistan

By Mohammad Ayaz, 1996

Abstract
The present study deals with the changes in the farming system with special reference to land use in space and time in two agro-ecological zones of Northern Pakistan. Each household was considered as a sample unit. Samples were taken randomly in the single cropping zone close to KKH, single cropping zone away from KKH and in the double cropping zone (herein after called zone). Simple statistical tools for drawing inferences were applied. In addition t-test for paired samples and t-test for independent treatment to assess changes in resource use with regard to time and space were applied respectively. The findings display relative changes in all the three zones during the last fifteen years. The development of new, cultivated land have fulfilled to a certain extent the demand for fodder for livestock. Potato cultivation has taken over

The lead in the single cropping zone close to KKH and consequently declined area under cereal cultivation. No significant change has taken place in land under cereal cultivation in both of single cropping zone away from KKH and double cropping zone. Grain produce Per unit area has increased in all the three zones. The use of improved high yielding varieties and chemical fertiliser have compensated the decrease in farm yard manure application caused by a decline in livestock numbers, in the double cropping zone followed by the single cropping close to KKH. Total numbers of trees, both fruit and non-fruit, have increased in all the three sites. Apart from changes in the land use practices, there are other independent factors responsible for affecting socio-economic conditions. The combined force of these factors has increased the literacy level and decreased the morbidity and mortality rates by improving hygienic conditions.

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Department of International Environment and Development Studies (Noragric), Norwegian University of Life Sciences
Perceiving and managing soil erosion by farmers in Kashmir, Pakistan

By Mohammad Shafique, 1997

Abstract
Mountain agriculture is the widespread and vital integrated farming enterprise throughout Azad Jammun and Kashmir. Soil erosion is the most serious mechanism of land degradation on arable lands. Very little efforts has been identified paid on soil and water conservation measure on farm lands with most activities concentrated on grain production.

The aims of the current study was to identify and describe the traditional and introduced soil conservation practices in relation to soil conservation and the socio-economic constraints to their implications. The study also aimed at suggesting alternatives for natural resource uses with special emphasis on soil conservation for sustainable agriculture development.

Generally, the socio-economic factors like illiteracy, poverty, small land holdings and unreliable farm income dominate the determination of farmer's perception, interest and attitudes towards soil management. Unpredictable climatic conditions and the relief are the vital factors among the crop production constraints. Low yields are the out-comes of depleted soils, insufficient crop rotation practices, high cropping intensities, the prevailing, agronomic practices and insufficient animal manure available at the farm fields.

The environment of central highlands of agro-ecological zones II and III, being relatively densely populated, has been identified as highly fragile and prone to degradation due to alarming human impacts. The same areas are being marked as the origins of soil erosion dominating in on-site and off-site downhill impacts recorded at the catchment areas. Intensive cultivation of slope lands and the over-grazed range lands come under the direct influences of erratic rainfalls.

The study identified main traditional soil and water conservation practices as tree plantations, terracing, Att-Bandi, Watt-Bandi, Karah making, drainage ditches, construction of loose stone protection walls against terrace heads and the land levelling. These practices were although effective objectively , however, were not practised enough in all the parcels of farm land because of lack of proper financial resources.

The soil conservation activities mainly includes tree plantations, engineering works like gully plugging in the water-sheds, the construction of wire-crates (gabions) and loose stone walls against the slipping land masses, as diversion/distribution/protection walls constructed across the stream flows, terracing and land levelling. Limited development funds, political/ administrative and socio-economic constraints has been identified in the establishment and effectiveness of these practices.

The study also concludes with a needed research program to quantify the magnitude of active soil erosion, the inter-relationships among essential causative parameters, the importance of land use and land capability classifications, cropping systems and devising their preventive or corrective measures.
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Department of International Environment and Development Studies (Noragric), Norwegian University of Life Sciences
Comparative study of Norwegian and Pakistani legislation concerning pollution control, with special reference to pollution problems on Gadoon Amazai Industrial Estate North West Frontier Pakistan

By Shahida Nasreen Zakir, 1997

Abstract
This study comprised of two parts. The first part, of the study was an attempt to compare the Norwegian and Pakistani legislation about the pollution control measures. In that connection various visits were made to the "SFT" Norwegian pollution control authority, the county control authority and Commune i.e the municipalities in June 1996. A similar attempt was made to visit the pollution control authorities in Pakistan for collecting information about the pollution control measures and it was observed that at present no legislative measures exist except an ordinance which is still not been implemented. The main emphasis of the study was to recommend legislative measures for Pakistani pollution control agencies to use Norwegian pollution control act as a model.

The second part of the study was to collect information regarding the pollution control in a case study i.e Gadoon Amazai industrial estate in District Sawabi of the north west frontier province of Pakistan. From the questionnaire survey it was found that no physical, chemical, biological and legislative measures existed in the estate.

The effluent samples were collected from twelve drains in the estate during July and Dec 1996 and various parameters for the waste water, i.e color, pH, organic and inorganic contents, conductivity, total solids, suspended solids, dissolved solids, COD, BOD5, nitrite, sulfide, sulfate and chloride were analyzed chemically. The observed values of the parameters were compared with the national environmental quality standards and it was observed that the waste water samples from most of the 12 drains contained high concentrations for the above mentioned parameters as compared to permissible limits. Various treatment measures i.e. physical, chemical and biological measures were recommended for the effluents discharged from the GAIE.

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Department of International Environment and Development Studies (Noragric), Norwegian University of Life Sciences
People, resources and sustainability: a study of resource management in Baltistan, Pakistan

By Tehmina Roohi and Lucie Jerabkova, 1997

Abstract
In general this study attempts to highlight the conditions of subsistence communities living in four different agroecological zones of Baltistan, that 'lead to unsustainable use of certain resources both in terms of their over-exploitation and under-utilisation.

This study establishes that the variations among the needs of the communities, availability of the resources and the use of resources are not an absolute function of the agroclimatic differences among the zones rather are more influenced by the access of the communities to the town market and their level of awareness. Nevertheless their needs and priorities vary from community to community. Study -reveals that the majority of the local people eke out their living from their existing natural resources through the establishment of integrated farming practices. In their prevalent limits of knowledge, farmers are well aware of the comparative advantages of resources. It is evident from the more dependence of high mountain communities on livestock and that of lower mountain communities on crop cultivation. However, in the face of increased needs there has been identified an alarming pressure on the resources. Biophysical indicators of unsustainability are invariably the function of environmental fragility, degradation of local institutional management systems and mismanagement of resources especially forests and rangelands resulting from labour shortage and youth alienation from traditional sociocultural practices of harnessing living.

Furthermore, it concludes that overall socio-economic conditions of the communities are positively connected with their accessibility as well as their ability to respond rationally to the changing socio-economic needs, without abandoning their traditional practices. Fragile environment of the mountains and cultural fragility of their inhabitants are highly subjected to deterioration by unsuitable social and economic interventions. There is an overriding need to develop alternative local income generating activities, to alleviate general poverty and consequently alleviate pressure on natural resources because their degradation leads to serious regional as well as national environmental and economic problems.
Role of gender in integrated pests and disease management: a case study of districts Failalabad and Multan, Pakistan

By Taqdees Raza, 1998

Abstract
Ample farm resources like land, labour and capital is the blessing of God in a country like Pakistan. Technical integration in agriculture has led to the enhancement of crop yield and the betterment of livelihood of farming community. The biological, chemical and mechanical technologies and socio-economic climate has encircled the constraints in farming systems. The investigation of farmer's perception regarding the constraints to Integrated Pest And Disease Management from sowing to harvesting has led to this rural survey which might provide guidelines for planning, research and extension work.

The effect of agricultural pests (fungi, bacteria, viruses, insects, mites, nematodes, weeds, rodents and grain eating birds) and plant protection with reference to Integrated Pest And Disease Management with participation of men and women is analyzed. In rural communities of Pakistan, crop rotations and other agricultural practices are to the large extent aimed at reducing pest incidence. After the wide-spread introduction of agro-chemicals in various parts of Pakistan, such practices has changed and agricultural production has intensified.

The intensification process rendered most crop plants more susceptible to pest and disease attack. Intensive use of pesticides has considerably affected the land and its biotic environment. Unfavourable side-effects resulting from the regular use of pesticides have led to the development of integrated pest and disease management placing emphasis on preventive measures such as cultural practices and maintenance of natural enemies. When concentrating on cultural practices, there is necessary to think broadly about roles of community men and women and their involvement in Integrated Pest And Disease Management practices.

This whole study have been carried out within a gender framework. Gender identity is socially and culturally constructed through the process of socialization whereby human being are concerned with their activities. Women and men are interacting each other for involvement and represent different interests and are backed by different resources. In Pakistani society, some discrepancies arises between men and women in agricultural activities and Integrated Pest And Disease Management practices in the context of social interests, cultural interpretations, knowledge and power are mediated and perpetuated through interaction between men and women.

This study is concerned with the Integrated Pest And Disease Management techniques against pests and diseases during production of crops and roles of men and women in Integrated Pest And Disease Management activities with outcome of Integrated practices including impact on the lives of farmers according to their own perception. This study also focused that how Integrated Pest And Disease Management techniques affect the ways in which people think about what they do and the transfer of a technique from an area with one set of norms affecting work roles to another with different expectations, beliefs and norms could sometimes bring
surprising outcome. Farmers might assess the linkages between access to and control of knowledge and the effective application of Integrated technology in development process.
Stakeholders’ perception on drinking water and sanitation and the potential for treatments systems in NWFP, Pakistan

By Bahadar Nawab, 2003

Abstract
Drinking water supply and sanitation in North West Frontier Province of Pakistan is not satisfactory by any standard and is deteriorating day-by-day with population growth. There exist a wide disparity in water supply, its consumption and provision of sanitation services to different classes and region and between urban and rural areas. The study was aimed to understand the existing condition of water supply and sanitation and the perceptions of stakeholders for potential improvement in the future. Important stakeholders' of this sector were interviewed and reconnaissance survey of the province was conducted. Combinations of qualitative methods like open-ended interview, group discussion, participants observation, transect walk and personal observation were dominant tools of data collection. Respondent's opinion and the field observations show that government had made huge investment in this sector, but is still not promising. The community, NGOs, politicians and academicians are critical to the government on her inefficiency, corruption and also for their exclusion from the advisory and decision-making process. The stakeholders' are more concern about the issue of drinking water supply and are little bother about sanitation. Majority of the population in rural areas are still stuck to their old customs of water-use, open-field defecation and unhygienic sanitation when population was less and the problem was not visible. Decentralized naturebased treatment of wastewater could be one option in rural areas to improve sanitation while open field defecation, common in the rural areas needs to be made user safe. There is an urgency of pragmatic policy, legislation and behavioural change in the government and other stakeholders' for improving the system. The rural people need to be educated about personal hygiene practices and they should be taught about the health hazards that accompany the use of contaminated water, unhygienic practices and unsafe sanitation. Aside from linking hygiene, water supply and sanitation, a possible strategy should be to make sanitation more attractive by linking resource recovery with it. Water supply, sanitation, health, education and poverty alleviation should be a combine package and must not be dealt with in isolation.
Institutions in natural resource management: a case from North West Frontier Province, Pakistan

By Shaukat Hayat, 1999

Abstract
This study was undertaken in the district Dir, North West Frontier Province, Pakistan. It is focused on the involvement of institutions in effective management of natural resources, mainly the forests. The main objective being to see the effect of the presence of the state institutions on the natural resource use and forest depletion.

Two major tools for obtaining information and data were used. Firstly, questionnaire, was employed in assessing the household characteristic, and subject like forest, user groups, forest products etc. Secondly, Participatory Rural Appraisal (PRA), used, digging out information about the social setting, history, present perception and views about the future regarding natural resources. It also helped in getting information about the various institutions and their role in natural resource management.

The household adaptation in the villages of Dir District partly reflect the resource endowments such as land, labour, capital and forest resources available for the production of household entitlements. This study observed that the cultivable land and capital is insufficient and most production processes are dependent on the family labour. This scenario inclined the people towards excessive exploitation of the surrounding forests. Land and labour have been the most important cause of social and economic in the villages of Dir.

The common pool resources have been exploited by a wide variety of user groups. They have different objectives and priorities for resource use. This results in creating problems in management. It has also been noticed that the customary laws, that used to be governed and respected in past have been seriously eroded. Centralized state institutions with an ethos of regulation and control are ill equipped to regulate and manage resource system with sustainable benefit streams

NWFP Dir has a variety of land tenure systems, this make land use planning difficult. It has resulted in conflicts and, insufficient and improper use of land. This situation applies to most of the state managed forests, where access and use conflicts have resulted into degradation and depletion of the resources. In case of Dir co-management or joint forest management is a feasible way forward, if its benefits are to be realised by both present and future generations.

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Department of International Environment and Development Studies (Noragric), Norwegian University of Life Sciences
Evolution of the Devolution Plan (2000): Local government system revived or reformed?: A study conducted in district Mardan of the NWFP, Pakistan

By Sajjad Ali Khan, 2006

Abstract
On August 14th 2000, the military regime in Pakistan, unveiled a Local Government Plan intended to strengthen the democratic institutions and to empower the people at the grassroots. It was urged that the Plan would increase access of marginalized groups in society to politics, enhance participation of ordinary citizens both in politics as well as the delivery of services, enhance accountability of the government functionaries as well as elected members and improve the delivery of social services. The Devolution Plan paved the way for the reestablishment of local governments at the district and sub-district levels. According to the Plan, political, administrative and fiscal powers were devolved to the local governments at the union, tehsil and district levels.

The fact that local governments in Pakistan in the past have mainly been used by regimes to legitimize control over the state and to achieve future survival, makes this ambitious attempt controversial. Especially, its contextual resemblance with the previous two attempts at local government reforms, further strengthen the notion of legitimization and survival. This study was thus an attempt to find out whether the same old wine has merely been presented in new bottle for the third time or actions have spoken louder than words this time. In doing so, the study tried to explore the perceptions of both the ordinary people and the elected representatives on the recent devolution plan. It took into account a number of things e.g. the motivation for the process, the recent local government elections and the impacts of the devolution process on; citizens' participation in politics as well as delivery of service, accountability and transparency and service delivery.

Data for the study was collected from seven union councils in district Mardan of the NWFP, Pakistan. Respondents in the study area were divided into four major categories because of the nature of the data required for the proposed research. The study has found that the Devolution Plan (2000) has both promises and limitations. As for motivation for the process is concerned the study found that the architect has followed in the footsteps of his predecessors. Despite exhibiting some continuations, the recent devolution plan, however, is considerably distinct from the previous local government reforms as far its substance and structure is concerned. Contrary to the previous local government reforms, it has devolved substantial political, administrative and fiscal powers to the lower tiers of government. However, it has an ambiguous nature, which is one of the major causes of hindering elected representative from the exercise of power. It has resulted in substantial decrease in powers and control over resources of both the civil as well as political bureaucracy. In addition to its ambiguous nature, the process is incomplete in many respects e.g. some of the departments have been devolved while others still remain under the provincial control. Similarly, in most of cases, only few services with in a department have been decentralized.
Regardless of having a number of bottlenecks, the recent devolution's impacts on democratic participation both as voters and as representatives and the delivery of services have been positive. Most importantly, the new local government system accruing from the Devolution Plan (2000) is popular among majority of the people.

By Najia Bazmi, 2005

Abstract
This study seeks to improve understanding of the relationship between poverty and natural resource management through examining Integrated Land Management Project (ILMP) contribution towards poverty alleviation through implementing NRM activities in Azad Jammu and Kashmir. The data for this study was collected in village Persacha situated in district Muzaffarabad. The primary data was collected using various PRA techniques including household survey, focus group discussion, transect walk, wealth ranking, resource mapping and individual interviews. The findings show that the majority of people in the study area depend on farming for their livelihood, however farm production is not sufficient to fulfill the needs of population in the area. They also depend on natural resources mainly forest and land for their lives. Forest resources are degraded over the time due to commercial and illegal wood harvesting. Poor people are depending on forest for fuelwood to meet their fuelwood consumption for cooking and heating in the harsh and cold climate of AJK. Beside poverty, the commercial harvesting of these resources is another reason of depletion.

There is increasing trend of off-farm activities in the study area as a result of increased population, land fragmentation, exposure, low farm productivity, ILMP interventions, and natural resource degradation. ILMP had started its interventions in this area in 1999 to address the issue of poverty through natural resource management and phased out in 2004. The project activities were focused on participatory development approach for mobilizing rural communities, especially women for access to productive resources, socio-economic development on sustainable basis. The approach adapted by the ILMP is participatory, flexible, and evolutionary. Programme believes in the generalized principles of cooperative behavior through the participation, and in the concept of "learning by doing". Women's role is changing as a result of male off farm activities and ILMP interventions. The project packages of vocational schools, poultry and livestock training, credit and water tank infrastructure have been found to have a direct impact on women's lives. The project's activities enhanced the status of local assets including social (CO/WO), natural (plantation, land protection), financial (saving, credits), human (trainings) and physical (water tank, protection wall, vocational school) capitals that in return provided more secure means of living for males and females in the study area. Under project limitations the interventions has had a great impact on the rural livelihood and improving natural resources in the study area as a whole, however individual households especially poor's needs were not addressed.

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Department of International Environment and Development Studies (Noragric), Norwegian University of Life Sciences
Assessment of conservation agriculture from an agronomic, economic and social perspective in Punjab, Pakistan

By Tabasum Noorjamal, 2006

Abstract

Conservation agriculture seeks to conserve and make more efficient use of natural resources combined with external inputs. Resource conservation technologies are being introduced for better utilization of available resources, reducing cost of production and enhancing productivity. Zero Tillage (ZT) and Conventional Tillage (CT) are two systems used in the Rice-wheat areas of Pakistan. The Rice-wheat system is one of the most of important systems in Punjab, Pakistan. Sowing of wheat through zero tillage technology under rice-wheat system in Punjab is becoming popular but at the same time researchers, extension experts and farmers may have some reservations in their mind. In Pakistan, ZT technology was introduced in the year 1996-97.

This study highlights the merits and demerits of ZT compared to the CT. The purpose of the study was to examine the effect of zero tillage on, wheat yield, soil fertility, and economic and environmental benefits compared to conventional tillage. Data were collected through questionnaire survey of 60 sample farmers. The results showed that the number of ZT drills and area under ZT method of wheat sowing has increased significantly through demonstrations by the directorate of On Farm Water Management (OFWM). The area under, wheat in ZT was 93% in Sheikhupura and 94% in Okara district. The study revealed that cost of land preparation for wheat sowing was higher (84 USD/ha) in CT. Average yield in ZT was 4151 Kg/ha as compared to 3768 Kg/ha in CT. The total expenditure per hectare in ZT was 68% lower while the net income was also higher in ZT (609 USD/ha) compared to CT (418 USD/ha). Farmers saved 7 USD/ha per irrigation in ZT. Weed incidence was found higher in CT compared to ZT. Concerning farmers' perceptions, 100% of the respondents showed willingness to continue with ZT in future. However the biggest constraint in the rapid adoption of ZT technology was the inadequate number of ZT drills.

It is suggested that farmers are educated about the ZT technology through extension efforts for its rapid adoption. The non availability of ZT drills needs immediate attention in order to promote Zero Tillage as it not only facilitate timely sowing of wheat but is also cost effective.

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Department of International Environment and Development Studies (Noragric), Norwegian University of Life Sciences
Land based livelihood in Baltistan, Pakistan

By Shagufta Jeelani, 2005

Abstract
This study explores level of dependency of the rural population on various sources of income (e.g. land, off-farm) and livelihood diversification patterns. The data for this study was collected in two villages; Khalangranga and Parang in district Skardu, Baltistan region, Pakistan. The area is rugged and mountainous with low vegetation cover. The primary data was collected using a combination of quantitative and qualitative methods including household surveys, focus group discussions, and wealth ranking and village profiles. The findings reveal that more than 90% population in the study area depend on farming. Fanning is the main livelihood option for rural communities. However it provide insufficient farm production to meet the needs. Poor households are more dependent on farm income compare to well off. As a result of the construction of KKH, land fragmentation, low farm productivity and increased population, households are diversifying their livelihoods toward off-farm opportunities. The distribution of income and opportunities are not equal for all wealth groups. Safety nets, mainly based on religious beliefs exist in the area and provide vital support for poor especially in times of crises. The households diversify their livelihoods mainly for two reasons, to reduce vulnerability and to accumulate wealth. As a result of low production coupled with other factors off-farm diversification has increased during the last twenty years. The underdeveloped market provides unequal distribution of resources and opportunities. Livelihood diversification is higher among males compare to the females. The main constraints for women's livelihood diversifications are cultural norms, social restrictions, and lack of education. However this trend is changing as a result of NGO interventions and male migration.