

## **Circulatory Land Tenure and Its Social and Ecological Impacts**

Authors: Nafees, Mohammad, Khan, Hizbullah, and Jan, Mohamad Rasul

Source: Mountain Research and Development, 29(1) : 59-66

Published By: International Mountain Society

URL: <https://doi.org/10.1659/mrd.898>

---

BioOne Complete ([complete.BioOne.org](https://complete.BioOne.org)) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at [www.bioone.org/terms-of-use](https://www.bioone.org/terms-of-use).

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

---

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

# Circulatory Land Tenure and Its Social and Ecological Impacts

## A Case Study of the Village of Allahdand Dheri in Northern Pakistan

Mohammad Nafees<sup>1\*</sup>, Hizbullah Khan<sup>1</sup>, and Mohamad Rasul Jan<sup>2</sup>

\* Corresponding author: nafees36@yahoo.com

<sup>1</sup> Department of Environmental Sciences, University of Peshawar, NWFP 25120, Pakistan

<sup>2</sup> Institute of Chemical Sciences, University of Peshawar, NWFP 25120, Pakistan

Open access article: please credit the authors and the full source.



This study explores the social and ecological impacts of circulatory land tenure in the villages of Allahdand and Dheri, situated near one another in the lower Swat valley (upper part of Malakand Agency). Apart from communal hill slopes,

agricultural land is divided into 3 categories: damani (rainfed), jewardara (irrigated but with no rice), and shoulgarey (irrigated, mainly used for rice). The people permanently own the rainfed land, while the irrigated land is under a tenure system known as garzinda wesh (circulatory tenure), with 10 years' tenure rotation allotted through khasanray (drawing lot). This type of land tenure system also exists partially in other villages of Upper Malakand such as Jolagaram, Khar, and Totakan. This system was introduced in the 16th century with the idea of sharing all types of land—including irrigated land,

fertile land, slope land, etc—in equal shares and with the aim of enabling the landowner tribe to respond collectively if some other tribe or majority tenants tried to seize any portion of land. Due to social conflicts, this system can have negative impacts today, especially in the form of soil erosion leading to land degradation. We highlight the positive and negative environmental impacts of the system. To this purpose, a detailed survey was conducted using focus group interviews, participatory rural appraisals, mapping, and transit walks with timelines. The results show how social response to the suitability of the system for livelihoods and social integrity can vary. The impact on fuelwood consumption is negative, leading to deforestation and lack of soil conservation. Abolishment of garzinda wesh in the village is recommended.

**Keywords:** Circulatory land tenure; soil conservation; Malakand district; Swat districts; North West Frontier Province (NWFP); Pakistan.

**Peer-reviewed:** December 2007 **Accepted:** October 2008

## Introduction and context

Land tenure and its socioeconomic and ecological implications have long been debated (Payne 2004). Since Hardin's (1968) famous and much discussed "tragedy of the commons" theory, the theme has been explored in many ways, among which Elinor Ostrom's 8 design principles add a new dimension to the debate (Sarker and Itoh 2001). In Pakistan, in the local context of a tribal social setup where a centralized cohesive mechanism (ie the state) was absent, the circulatory land tenure system (*garzinda wesh*) worked to maintain the integrity of the society and keep ownership of the entire landscape within the hands of single ethnic groups, even if these groups were a minority in the local population. Through *garzinda wesh*, collective ownership of tribes enabled an integrated response to external (invading tribes) and internal (revolt by the majority of subjugated tribes or tenants) threats. Collective circulatory tenure of cropland was obligatory in the tribal environment; it was necessary for the commanding tribe to maintain possession of land. However, after permanent settlement began and revenue recording was established, such collective and circulatory

tenure arrangements became prohibitive to effective use of land resources. This paper investigates the landowner communities' perception of the system and analyzes its economic and ecological repercussions.

The history of *garzinda wesh* shows that initially large landscapes were exchanged between *samma* (southern plain area of Mardan and Sawabi districts) and *swat* (northern mountainous area of Malakand and Adinzai area of Lower Dir and Swat districts). This was followed by a *garzinda wesh* system at the *tappa* level (medium landscape), village level, and finally within the village. The *samma*- and *swat*-level *wesh* were terminated very soon after their initiation due to disputes among the 2 Yousafzai subtribes occupying the territories (probably before 1600), while the *tappa*-level *wesh* ended arbitrarily with the occupation of Malakand by the British and of Adinzai (southeastern part of Dir) by the Nawab of Dir in 1880–1900. After the establishment of Swat state in 1917, the first *wali* (king) of Swat worked to strategically abolish the *wesh* system (Sultan-i-Rome 2005) in order to weaken the integrity of Yousafzai tribes and to establish the writ of his state. In Malakand Agency (now the District of Malakand), however, village-level *wesh* still continues in

some villages, including the 2 adjoining villages of Allahdand and Dheri. In this district are two main *tappas*: Baizai (southeastern part of Malakand) and Ranizai (northwestern part of Malakand). In Baizai *tappa*, *wesh* has already been abolished, while in Ranizai *tappa*, it still exists in half of the villages. These villages include Jolagram, Khar, Totakan, and Allahdand and Dheri (now commonly known as Allahdand Dheri).

The process adopted for allotment of land in *garzinda wesh* is that land parcels are allotted through *khasanray* (drawing lot). The *wesh* include the *ghar* (hillside) and *samma* (plain area) land, including *damani* (rainfed), *jewardara* (semi-irrigated, for growing maize), and *shoulgara* (irrigated, for growing rice) land in the territory of a village (*dawtar*) (Inam-ur-Rahim and Viaro 2002). In the local context, with the gradual extension initially of the British and then the Pakistan state to the Malakand Agency, the elders (*masharaan*) of the landowner tribes strategically abolished *garzinda wesh*, either completely or partially. In Allahdand Dheri village, partial *wesh* was adopted; the *damani* area was permanently divided in the first phase (mid-20th century). However, during the early 1970s, because of the forceful occupation of the land by the tenants and the inability of the individual landowner families to maintain their ownership, the permanent distribution (*toriraan wesh*) of the *jewardara* and *shoulgara* was avoided or delayed.

Some local researchers (Inam-ur-Rahim 2000, 2002; Lubna 2001; Inam-ur-Rahim and Viaro 2002) have highlighted the social aspects of the tenure system, while others have studied the historical aspects of its abolishment over time (eg Sultan-i-Rome 2005) or investigated the possibilities of farming, forestry, and agroforestry on such lands and associated problems (Zubair and Garforth 2006). The economic and ecological aspects of circulatory land tenure remained to be investigated. Hence, this paper focuses on two aspects of *garzinda wesh* based on social survey techniques: the mechanisms of *garzinda wesh* and the economical/ecological costs and benefits. In this study an attempt has been made to answer questions such as, what are the problems associated with the present system, and how can corresponding tenure conflicts and resource degradation such as soil erosion and deforestation be avoided?

## The study area

Allahdand Dheri is a small village located at latitude/longitude 343422.49 N, 715901.47 E to 343842.23 N, 720214.96 E in the lower southern part of Swat valley, in the administrative subdivision of Swat Ranizai in Malakand administrative district (Figure 1). It is surrounded by mountains to the east, west, and south; cultivated land and the river Swat lie to the north. The households that have a share of landholdings in the village belong to the Ali-Khail subsection of the Yousafzai tribe.

The total area, including cultivated land and suburbs, is about 21.38 km<sup>2</sup>. The 13 village wards (*mohallahs*) include the residents of landowner families (*khail*), and 7 main hamlets (*banda*) in the foothills with rainfed land are occupied mainly by the tenants. According to the 1998 census the total population of the area was 32,506.

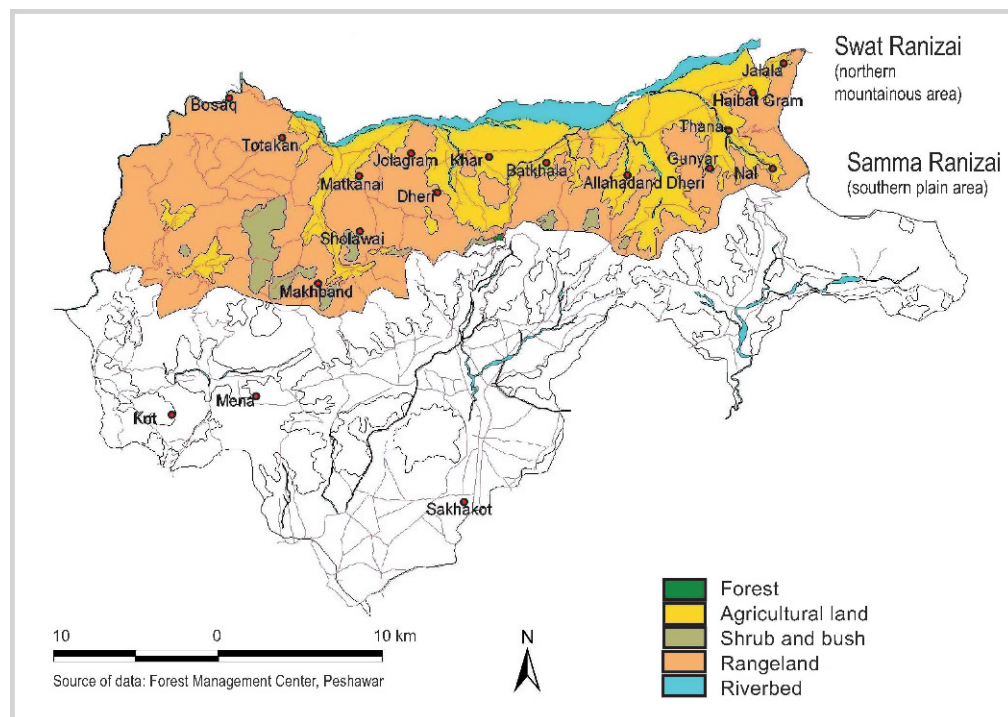
The hillside is communal land and is generally used for grazing and fuelwood collection, mainly by tenants. The gentle slopes close to the hillside are used for rainfed agriculture. Tenants occupy some of the permanently divided *damani* land, while a large proportion is still possessed by traditional landowners. The irrigated land is divided into two main types, *jewardara* and *shoulgarey*. The continual availability of water and its marshy nature make *shoulgarey* suitable for cultivating rice along with other crops, whereas the intermittent irrigation possibilities in *jewardara* make that area suitable for maize and vegetable fields and orchards. Among *shoulgarey* are the lands called *serai* that are permanently allocated to the leaders of the subtribes, holy families (*sayydan*), and Chief of Masque (*Paish-Imam*) for their religious services; *sairai* are therefore not part of the circulation.

## Methodology

To prepare the land use map, satellite images available from Google Earth were accessed between 15 May 2006 and 13 February 2007. A global positioning system (GPS) was used during 7 transit walks to explore the proportion of different land types (4 walks east–west and 3 walks north–south). The GPS was calibrated at 3 points: Amandara Square (343713.75 N, 715917.66 E), Chakdara Bridge Square (343714.75 N, 715917.66 E), and Allahdand Dheri Choke Square (343710.23 N, 720125.02 E). The Google Earth image Digital Globe @ 2007 by the Quick-Bird satellite was imported in JPG format in IDRISI for digitization and quantification. The display resolution was 1024 × 768 pixels and ground resolution was 2.4 m. The map produced was exported again into JPG format. The map of Malakand district was composed in ArcView. Information for the map of Malakand district was retrieved from the Forest Management Center in Peshawar.

To explore the willingness of the landowner families to continue circulatory tenure through the drawing of lots, interviews were carried out in the village. As landownership is limited by definition to males, only men were interviewed. The interviewed people included both elderly and younger males who had a share of landholdings. Altogether, 300 respondents (landowners), or 20% of the total number of households that owned land in the village, were interviewed. To identify trends in fuelwood collected from the surrounding mountains, a participatory rural appraisal was conducted using the timeline method.

**FIGURE 1** Map of Malakand district and study area. (Map by M. Nafees; source: Forest Management Center, Peshawar, Pakistan)



## Results

Under the current situation, landownership in the study area is divided into private and communal land. The mountains are communal land and belong to the whole landowner tribe, with absent landlords who have shares of different subsections. However, these shares are open to everyone for grazing and fuelwood collection, particularly to the tenants occupying the adjoining foothills. Rainfed cultivated land is under permanent private ownership, while irrigated land is under a communal type of ownership with temporary allotment to individual households for periods of 10 years.

Cultivated land is either rainfed or irrigated through a canal diverted from the river Swat. The rainfed area covers 705.12 hectares (32.97%), and the irrigated area covers 355.77 hectares (16.64%). With 78.68 hectares (3.68%), horticulture is part of the irrigated land under permanent ownership, while the residential area covers 265.75 hectares (12.43%) and mountains slopes cover 732.77 hectares (34.27%), totaling 2059.41 hectares of landed estate or *dawtar* (Figure 2).

As shown in Table 1, among the interviewed landowners, 11.67% possess an equal amount of land with maize and rice. They are happy with both maintenance and abolishment of circulatory tenure through drawing of lots. An additional 61.66% produce sufficient wheat or rice: they obtain all of their household's staple subsistence requirements from their own landholdings and do not need to purchase staple foods elsewhere. This group does not

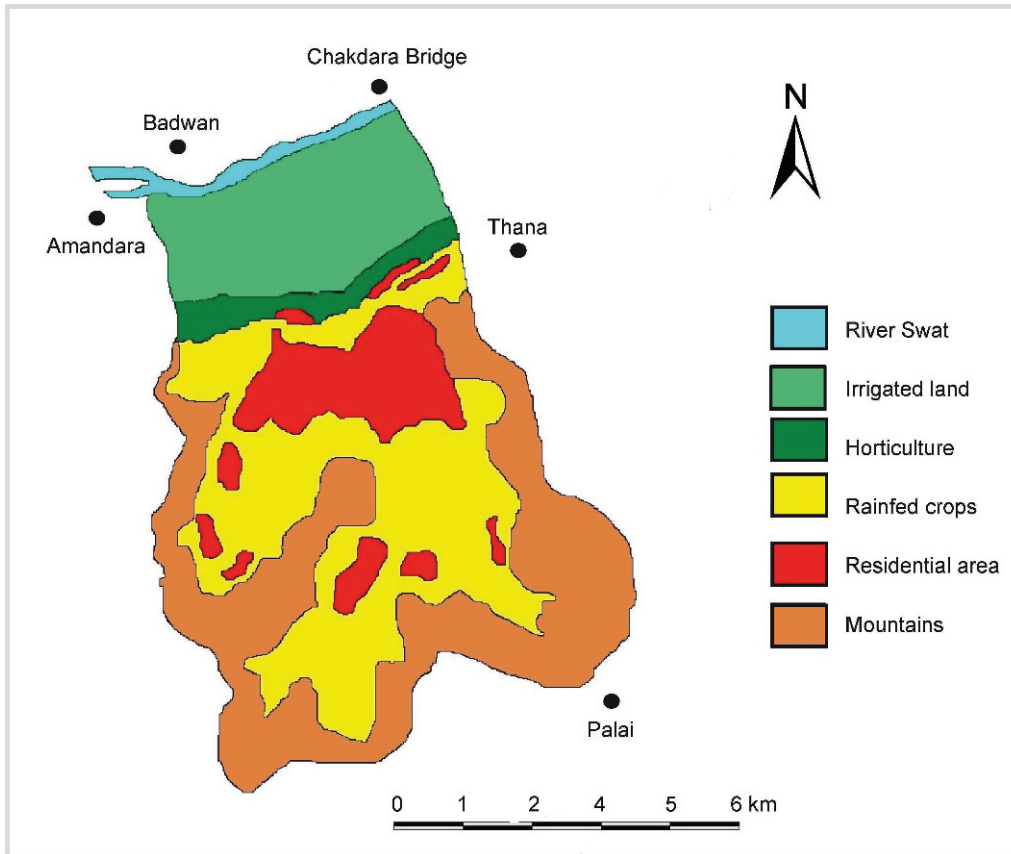
want to abolish circulatory tenure. Another 26.67% have small landholdings with either type of land; of this group, 44.75% (11.66% of the total) have limited good-quality land and are very much interested in the *khasanray*, or lot-drawing system, because they hope to get a larger piece of land in the coming *khasanray*. The remaining 55.25% in this group seem satisfied with their present holdings. In this way only 11.66% of the whole village is in favor of *khasanray* and another 11.66% are happy with either maintaining or abolishing the system, while the remaining 76.67% are not interested in keeping it (Table 1).

Due to shortage of fuelwood and free access to the communal hillside area, people were collecting fuelwood from the surrounding shrub-covered mountains. These mountains sufficed to support the village inhabitants' need for fuelwood until the early 1980s. Then, within a period of 5 years, forest and shrub cover disappeared completely. The reason for this was partly social—including the tragedy of the commons—and partly political as, during the late 1970s, the hillside tenants who occupied the area revolted against the landowners and the traditional hillside control and management system vanished. As a result, everyone started cutting trees and shrubs, after which they also dug out the roots for a period of 4–5 years. Now the mountains are completely barren (Figure 3).

Figure 4 shows a decrease of up to 40% in the consumption of fuelwood in the last 47 years. During the period 1960–1965 all the households were using fuelwood for cooking and heating, as no alternative was available in the village. From 1965 onward the use of kerosene stoves



**FIGURE 2** Land use map of the village of Allahdand Dheri. (Map by M. Nafees; created using Google Earth and IDRISI)



was initiated. These stoves had a pungent smell but produced no smoke and helped reduce fuelwood consumption. In 1975, liquefied petroleum gas (LPG) cylinders reached the village and gradually started replacing the kerosene stoves, with well-off families handing on the stoves to the middle-income group. From

2005 to 2006, a natural gas supply pipe reached some areas in the Malakand Agency and Allahdand Dheri village, and it is likely to be extended to the entire village in the future. This will further increase the shift to nonwood fuel resources and may reduce pressure on hillside fuel resources around the main villages. On the

**TABLE 1** Landownership and people's attitudes toward circulatory tenure with *khasanray* in the village of Allahdand Dheri. (Source: interviews)

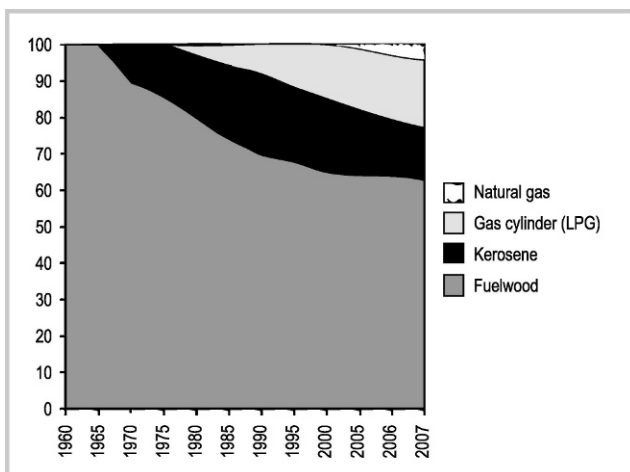
Respondents' answers regarding their landholdings	Total number of answers	% answers	Wish to abolish <i>khasanray</i>	Wish to continue <i>khasanray</i>	Happy with both solutions
Possess equal proportion of land with maize and rice	35	11.67	Nil (0%)	Nil (0%)	35 (11.66%)
Possess land with rice, with surplus rice production	85	28.33	85 (28.33%)	Nil (0%)	Nil (0%)
Possess land with maize or wheat, with surplus production	100	33.33	100 (33.33%)	Nil (0%)	Nil (0%)
Possess small plot of either type of land	80	26.67	45 (15.00%)	35 (11.66%)	Nil (0%)
Total	300	100	230 (76.67%)	35 (11.66%)	35 (11.66%)

**FIGURE 3** Example of severe gully erosion, caused partially by *khasanray* or lot-drawing circulatory tenure. Deforested mountains are visible in the background. (Photo by M. Nafees)



other hand, in spite of all these innovations the tenant residents of scattered hamlets and the poor in the village are still largely dependent on fuelwood for cooking and heating, as they have no access to the alternative fuel resources. Despite its availability, electricity is not used for cooking and heating because of its high cost.

**FIGURE 4** Trend in use of fuelwood and alternate sources of energy from 1960 to 2007.



## Discussion

### Contemporary trends

Traditional societies developed rich, flexible legal systems that were well adapted to local circumstances. Indigenous law offered the population residing in a particular environment a range of suitable solutions that met their needs (Verhelst 1992). The *garzinda wesh* system provided a sustainable base for survival to the local people for almost 5 centuries in a conflictual tribal environment. On the other hand, in marginal areas communities' highest priorities were issues that carried the most immediate implications for their survival and wellbeing (Fussel 1995). Hence, there is a need for better quantitative information and assessment of the social and economic causes and consequences of land degradation (Sombroek 1996).

Village-based partial fixation of the *garzinda wesh* system started in 1919 in the upper and middle part of the Swat valley and was completed by 1929 (Sultan-i-Rome 2005), due to the interest of the *wali* of Swat. The Malakand Agency appeared as a separate administrative unit during 1895–1896 (Fatima and Batoor 2008); hence, such fixation could not be extended to the lower Swat valley, which was a separate administrative unit. Therefore, land distribution through drawing of lots was maintained in some villages of the lower part of the Swat valley (Swat Ranizai) and is still being practiced in some

areas today, such as Allahdand Dheri, Khar, and Totakan. The system has both positive and negative implications, not only for soils but also for other natural resources such as forests and wildlife; moreover, it has a direct impact on the socioeconomic condition of the people, particularly the landowner group.

Indeed, the freezing of the *garzinda wesh* system on the one hand may provide new opportunities for medium- and long-term investment in agriculture and housing development (Taddese 2001), but on the other hand it may initiate conflicts over landownership elsewhere, either between villages or within villages (Kusters et al 2007), particularly among Pukhtun cousins (this main ethnic group occupied the area in the early 16th century). Moreover, the refusal of tenants in some southern parts of the valley to pay rent to the individual landowners, in an attempt to abolish circulatory land tenure, led to several armed encounters with bloodshed between the landowners and tenants, particularly during the late 1970s. Tenants in Malakand had organized themselves politically under the slogan of a peasant movement called Kissan Tehrik; freezing of *garzinda wesh* did not facilitate the position of landowners, who lost the unified stand they had had during circulatory land tenure.

In case of permanent distribution of land and rapid demographic growth, the land share available to individual households decreases to the extent that its cultivation is no longer economically viable. The lower farm income and seasonality in production for small landholders compel their youth to migrate to lowland cities and abroad to produce remittances. This causes remittance-dependent population explosion, further fragmentation of land, extension of cropland to marginal land, and labor force shortages during peak periods (Inam-ur-Rahim 2000). This in turn leads indigenous agriculture to gradually become a secondary to tertiary activity. Land is mainly viewed as a salable asset or a zone for future residential construction. Most of the accessible small parcels of fertile land available in the valley under permanent distribution are therefore increasingly encroached upon by concrete buildings, including residences and shops (Inam-ur-Rahim 2002). Being under circulatory *wesh*, the *shoulgarey* of Allahdand Dheri are the only large cultivated landscape left in the entire valley and may meet the same fate in the absence of appropriate land use planning after abolishment of the *wesh* system.

In the village of Allahdand Dheri, because of a conflict over reallocation of land in 1982, this system could not continue, and the people who had some land at that time still possess the same plots as allotted in 1978. Because they fear that these plots may be redistributed and despite the fact that they have possessed these land units for the past 30 years, they do not use it for any kind of construction, horticulture, or other perennial plantation. This leads to economic disadvantages for the individual landholding family. On the other hand, circulatory tenure may also offer

an opportunity to develop a fully mechanical large-scale communal agricultural enterprise with profits for the different landowners according to their shares of land. This would be in line with collectivization trends in developed economies, if appropriately strategized as suggested by Ashutosh and Tadao (2001) for Japanese common-pool irrigation resources. The small and dispersed parcels of land resulting from permanent distribution may serve as salable assets or be covered by concrete buildings, but that use may lead to more effective investment in physical improvement, particularly of large pieces of land, leading to more economic benefit for the landholding households.

### Conflicts and conflict management

As resource managers, landowners divided the landscape into sites comprising one to several soil series with different production capacities (Archer and Smeins 1991); hence, land division under *garzinda wesh* included different productivity zones. Such land zones were also differentiated according to slope and accessibility criteria (Pratt et al 1997). During distribution and reallocation, soil fertility is the main factor considered. A person with less fertile land, called *kayeena*, will receive extra land attached with what is called *ewaz* (benefit), which is 30% of the total leading to the possession of a large piece of land, whereas the person with fertile land, called *gwariza*, receives a small land share.

Such zoning at one time promoted equity in distribution of the benefits within a longer time frame, but it has now become a cause of conflict. Currently some people who have large plots of land and are presently occupying *gwariza* land are not interested in *khasanray*, nor are those who now have a large plot in the form of *kayeena* and must expect a small piece of *gwariza* after reallocation interested in *khasanray*. People with a small plot of *gwariza* expecting a large piece of land in reallocation, or people with a maximum plot where they can grow maize and minimum land for rice, are interested in *khasanray*. Similarly, people presently allotted land along the roadside are not interested in the redrawing of lots, while those at a distance from the road also favor redistribution of land. All the people interviewed are therefore looking to their personal interest and not to the collective advantage or disadvantage of circulatory tenure.

In 1982 the Water and Power Development Authority (WAPDA) passed a 66 kV electric line through the land under circulatory distribution and paid Pakistan Rs 30,000 (approximately US\$ 500) per pole to each landowner. The WAPDA people were unaware of the situation and paid the money to the shareholders who held the land when the electric poles were erected. Later, during reallocation in 1988, people who were supposed to receive the land with electric poles in reallocation asked for a share in the paid money of Rs 30,000, but the previous possessors were not willing to pay. This led to postponement of *khasanray*. When the people met again in

1998, the stakeholders who had been paid showed their willingness to repay the Rs 30,000 they had received for further distribution. In response, the people who were expecting their share asked for provision of the money according to the inflation rate of the previous 10 years. This request led to division among landowners on the issue of redistribution. In Dheri, *khasanray* took place, and in Allahdand, those involved are still in conflict.

This conflict can negatively affect natural resources, as revealed from a study conducted in Indonesia, where a conflict arose in 1998 on land tenure between local communities and tree plantation companies, and also between local communities and the forestry department. The hazard appeared in the form of unwanted fires and forest degradation-related smoke and gas emissions, leading to environmental and economic losses (Suyanto 2006). Another study regarding common property was conducted in Ethiopia; it concluded that this regime was good for conservation of natural resources and people's livelihoods (Zealelem and Williams 2005) and led to a conflict-free situation. However, in Zimbabwe conflict emerged on communal property during the post-independence period as of 1980. The indigenous system was continued for about 20 years, which put pressure on land and other natural resources, and was ultimately changed as a result of a peasant movement in 2000. The reallocation of the communal land led to a lifting of the burden on natural resources and an improvement of the socioeconomic condition (Moyo 2005). Individual property ownership has also been supported by Liu et al (2004), who studied the impact of management change that took place in 1970, wherein an attempt was made to put responsibility on households and shift from the collective farming system to individual family farms. An increase in the yield was observed with a decrease in soil fertility, for which proper use of fertilizers was suggested.

#### People's attitude toward *khasanray*

Due to the temporary nature of the availability of irrigated land (10 years), no construction of any kind of building can take place on it. In this way, construction on rainfed land continues, and people are deprived of one kind of asset (rainfed land); however, the ban has also prevented conversion of the most fertile land to concrete surfaces, though it is an impediment to the socioeconomic development of the stakeholder communities. As observed in Maya, Belize, the land tenure system (60% of the population have no ownership) in combination with limited availability of agricultural land, the low level of investment in agricultural production, and limited marketing opportunities are the main reasons for forest degradation. The study was in support of permanent ownership (Levasseur and Olivier 2000).

This system also discourages long-term "green" activities such as agroforestry or horticulture (Kakembo 2001). On the one hand it affects the socioeconomic

condition of the people (Dale 1997), and on the other hand it has an impact on the availability of fuelwood. The maize-growing (*jewardara*) land is very much suitable for horticulture, with supplementary fuel obtained during pruning, but the lot-drawing system discourages such interventions. If the people in the area start using this land for horticulture, maize production will decrease 10–20%, but in return, the people will harvest fruit, which is economically more beneficial than maize. The same trend has been observed in the villages of Sandwip Upazila, Chittagong district (Momen et al 2006).

Another option that may help increase economic power in the area is developmental activities along the roadsides. Almost 15% of the land is permanently allocated, called *serai*, and mostly situated along the road. It is used for tourist activities such as cafés, generating more income than mere use for rice cultivation, while similar land under *khasanray* cannot be used. If the *garzinda wesh* is abolished, the remaining land situated on along the road will also be available to the people to improve their economic condition. This type of relationship is reflected in a study conducted in Benin, in western Africa, where land tenure was related to long-term commercial use of land. It was argued that as tenants, the landless are disadvantaged compared with landowners in terms of their ability to adopt agroforestry systems. This is due to a lack of land resources, tenure insecurity, and restrictions in planting perennial crops. State interventions and conflicts between farmers and pastoralists further limit land tenure security of the rural population and thus reduce the willingness of peasants to invest on a long-term basis and to protect natural resources (Neef and Heidhues 1994).

A further problem detected by the study was the following: people tend not to take into consideration the problem of erosion due to floods (Figure 3). Rather, they cut the steel wire used in the embankment as a net and use it for fishing or other personal needs, hence exposing the protected land to flooding. Besides, deforested mountains are not only contributing to erosion but also leading to habitat loss. In this way, agricultural land (both rainfed and irrigated) is under continuous threat of erosion. Due to communal tenure conflicts, the mountains have been severely degraded. Rehabilitation of degraded lands is, however, a complex and long-term issue and requires integration of various technical, social, and political concerns (Atiq-ur-Rehman 1997). Various organizations have engaged in rehabilitating these mountains (Lubna 2001). But insecure tenure along with heavy pressure in terms of fuelwood collection is limiting effectiveness. To bring sustainability to reforestation and afforestation activities, it is important to encourage agroforestry (Zubair and Garforth 2006) and horticulture on both rainfed and irrigated land. Kerosene oil, LPG cylinders, and recently natural gas were introduced in the area with the idea of decreasing the pressure on fuelwood.



These alternative sources of energy have proven beneficial for the environment.

The suspended sediment load in the river Swat, according to the WAPDA (Lahore record), was 2207.53 t/day in 2001. This figure increased to 10,754.18 t/day in 2002 and 41,458.49 t/day in 2003. The average daily discharge was 137.81 m<sup>3</sup>/s, 152.77 m<sup>3</sup>/s, and 186.72 m<sup>3</sup>/s for the years 2001, 2002, and 2003, respectively. This ever-increasing suspended sediment load is a clear indicator of soil erosion attributed to deforestation, partly contributed by *garzinda wesh*.

## Conclusion

Based on historical documents, a literature review, and a local study, the system of revolving ownership in the

current sociopolitical environment was found to be detrimental to conservation of natural resources, especially forests and soil; moreover, no conservation measure seemed to be productive under such an uncertain land tenure situation. In the study area, a minority of the landowners was found to be interested in continuing the *garzinda wesh* system, while the majority was willing to abolish it. We therefore propose to abolish *garzinda wesh* on a permanent basis, not only in the village of Allahdand Dheri but also in the surrounding villages such as Jolagaram, Khar, and Totakan, after appropriate participatory land use planning has taken place. Another option may be to retain communal ownership but avoid rotation. In this case, the land could be rented out (for 20 years or more) for a corporate farming system, and rent money could be distributed according to shares.

## REFERENCES

- Archer S, Smeins FE.** 1991. Ecosystem level processes. In: Heitschmidt RK, Stuth JW, editors. *Grazing Management: An Ecological Perspective*. Portland, OR: Timber Press, pp 109–139.
- Ashutosh S, Tadao I.** 2001. Design principles in long-enduring institutions of Japanese irrigation common-pool resources. *Agricultural Water Management* 48(2):89–102.
- Atiq-ur-Rehman.** 1997. *Animal Feed Resources and Their Utilization in Asghara-Wazulun and Kach Mulazai Project Areas. Integrated Range Livestock Development Project*. Quetta, Pakistan: Food and Agriculture Organization.
- Dale P.** 1997. Land tenure issues in economic development. *Journal of Urban Studies* 34(10):1621–1633.
- Fatima A, Batoor K.** 2008. Talibanisation and Pashtuns—Myth and reality. Rehman's Pushtoon Belt Database. [http://ramanspashtunbeltdatabase.blogspot.com/2008\\_01\\_01\\_archive.html](http://ramanspashtunbeltdatabase.blogspot.com/2008_01_01_archive.html); accessed on 28 March 2009.
- Fussel W.** 1995. Treating the causes not the symptoms. *Ileia News Letter* 11(3):30–31.
- Hardin G.** 1968. The tragedy of the commons. *Science* 162(3859):1243–1248. <http://doi:10.1126/science.162.3859.1243>
- Inam-ur-Rahim.** 2000. *Labor Migration from the Macro-environment and Agricultural Marketing in Mingora*. Saidu Sharif, Pakistan: Environmental Protection Society.
- Inam-ur-Rahim.** 2002. Ownership and use pattern: Trends in the communal lands of Swat valley. In: Zabta KS, Ashiq AK, editors. *Tenure, and Resource Ownership in Pakistan*. Swat, Pakistan: World Wide Fund for Nature Branch Office, pp 72–84.
- Inam-ur-Rahim, Viaro A.** 2002. *Swat: An Afghan Society in Pakistan. Urbanization and Change in Tribal Environment*. Karachi, Pakistan: City Press.
- Kakembo V.** 2001. Trends in vegetation degradation in relation to land tenure, rainfall, and population changes in Peddie district, Eastern Cape, South Africa. *Journal of Environmental Management* 28(1):39–46.
- Kusters K, Foresta H, Ekadinata A, Noordwijk MV.** 2007. Towards solutions for state vs. local community conflicts over forestland: The impact of formal recognition of user rights in Krui, Sumatra, Indonesia. *Journal of Human Ecology* 35:427–438.
- Levasseur V, Olivier A.** 2000. The farming system and traditional agroforestry systems in the Maya community of San Jose, Belize. *Journal of Agroforestry Systems* 49:275–288.
- Liu XM, Xu JM, Zhang MK.** 2004. Effects of land management change on spatial variability of organic matter and nutrients in paddy field: A case study of Pinghu, China. *Journal of Environmental Management* 34(5):691–700.
- Lubna H.** 2001. Analyzing institutional set-up of forest management in Pakistan. Research Report No 182. Islamabad, Pakistan: Pakistan Institute of Development Economics. <http://www.pide.org.pk/Research/Report182.pdf>; accessed on 12 February 2008.
- Momen RU, Huda SMS, Hossain MK, Khan BM.** 2006. Economics of the plant species used in homestead agroforestry on an offshore Sandwip Island of Chittagong district, Bangladesh. *Journal of Forestry Research* 17(4):2285–2288.
- Moyo S.** 2005. Land and natural resource redistribution in Zimbabwe: Access, equity and conflict. *Journal of African and Asian Studies* 4(1–2):187–224.
- Neef A, Heidhues F.** 1994. The role of land tenure in agroforestry: Lessons from Benin. *Journal of Agro Forestry Systems* 27(2):145–161.
- Payne G.** 2004. Land tenure and property rights: An introduction. *Habitat International* 28:167–179.
- Pratt DJ, Gall FL, Haan CD.** 1997. *Investing in Pastoralism: Sustainable Natural Resource Use in Arid Africa and the Middle East*. Technical Paper No 365. Washington, DC: World Bank.
- Sarker A, Itoh T.** 2001. Design principles in long-enduring institutions of Japanese irrigation common-pool resources. *Agricultural Water Management* 48:89–102. [http://doi:10.1016/S0378-3774\(00\)00125-6](http://doi:10.1016/S0378-3774(00)00125-6).
- Sombroek WG.** 1996. Land resources evaluation and the role of land-related indicators. In: FAO [Food and Agriculture Organization], editor. *Land Quality Indicators and Their Use in Sustainable Agriculture and Rural Development*. Proceedings of the Workshop Organized by the Land and Water Development Division, FAO Agriculture Department, and the Research, Extension and Training Division, FAO Sustainable Development Department, 25–26 January 1996. *Land and Water Bulletin* 5. Rome, Italy: FAO Corporate Document Repository. <http://www.fao.org/docrep/W4745E/w4745e00.htm#Contents>; accessed on 12 February 2008.
- Sultan-i-Rome.** 2005. *Forestry in the Princely State of Swat and Kalam (North-West Pakistan). A Historical Perspective on Norms and Practices*. Berne, Switzerland: NCCR North–South [Swiss National Center of Competence in Research North–South]. [http://www.geo.unizh.ch/human/research/pdf\\_etc/Rome\\_Swat.pdf](http://www.geo.unizh.ch/human/research/pdf_etc/Rome_Swat.pdf); accessed on 24 February 2006.
- Suyanto S.** 2006. Underlying cause of fire: Different form of land tenure conflicts in Sumatra. *Journal of Mitigation and Adaptation Strategies for Global Change* 12(1):67–74.
- Taddese G.** 2001. Land degradation: A challenge to Ethiopia. *Journal of Environmental Management* 27(6):815–824.
- Verhelst TG.** 1992. *No Life Without Roots: Culture and Development*. London, United Kingdom: Zed Books.
- Zealelem TA, Williams LN.** 2005. Indigenous common property resource management in the Central Highlands of Ethiopia. *Journal of Human Ecology* 33(4):539–563.
- Zubair M, Garforth C.** 2006. Farm level tree planting in Pakistan: The role of farmers' perceptions and attitudes. *Journal of Agroforestry Systems* 66(3):217–229.