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**People and forests: Analysis of Willingness to
Enroll in the “Saving Book Approach” for the
reforestation of severely degraded forests in
Gorno Badakhshan, Tajikistan**

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The way you look after the forest today that way it will look after you tomorrow (interviewee in Imam village)

There is no comfort, without hard work! This is a very true saying for forestry! (interviewee in Sadvadg village)

A village which does not have two things, forests and water is not a real village and cannot survive very long (interviewee in Chilizat village)

In the Pamirs you have to live in a place where there should be a huge lake, arable land or forest. Everyone tries to be in a place where there are forests! They provide endless benefits! (interviewee in Vuzh village)

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Declaration of originality

Hereby, I declare that this master thesis was written by me and that I did not use any other sources and means than specified. This Master thesis was not submitted at any other university for acquiring an academic degree.

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Abstract

Forests provide fundamental services, which are necessary for the survival of local people especially in developing countries. However, at present ecosystem services (ES) of forests are undervalued, widely deteriorating or destroyed, thus their 'supply' is being reduced. This is mainly a result of an inadequate management of the resources not involving one main group of beneficiaries of the ES – the local people. In response to the growing concerns about the present loss of ES of forests, participatory community based management approaches have been developed and tested. For the protection and rehabilitation of the riparian forests of Gorno Badakhshan (Tajikistan), the State Forest Agency (*Leskhoz*) in collaboration with the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH in 2005 started to implement the Joint Forest Management (JFM) approach by involving local people of the villages in the management. *Leskhoz*, as the responsible organization for the management of the State forests, on the basis of a detailed lease contract hands over long term property rights for the forests to local people, whose livelihoods depends on forests. In return, *Leskhoz* is helped to achieve its protection and rehabilitation goals. Based on six years of positive experience with JFM in Gorno Badakhshan it revealed to be an appropriate tool to rehabilitate and sustainably use the forests, where at the same time local people can receive a wide range of benefits from their participation. However, in severely deserted areas the approach fails, since comparatively high initial investments are necessary. In such areas *Leskhoz* and GIZ have recently started to implement on a 20 hectares pilot plot the Saving Book Approach (SBA), which is a Payments for Ecosystem Services (PES) - like scheme. *Leskhoz* supports JFM tenants on severely degraded plots with reforestation inputs, such as planting and fencing material. In parallel, for a period of 6 years, they are compensated for their work inputs for reforestation and protection measures. Local people, participating in the rehabilitation of a plot will be compensated until benefits in form of forest plots products can be gained. The *Leskhoz* and the tenants elaborate achievable annual plans. After reaching the annual targets, a respective amount of money will be released from the saving book at the name of the tenant.

For a further dissemination of SBA, an analysis of factors, which influence the decision of local people to enroll or not to enroll in SBA is needed. The purpose of this research was to determine the factors influencing local people's Willingness to Enroll (WTE) in SBA on the village level and to identify suitable forest plots in terms of needed investment for the reforestation under SBA. For this, three villages and plots in Gorno Badakhshan, where this study was conducted, were chosen. At the same time, the results of the three studied villages were triangulated with the results of the pilot plot, where the implementation of SBA has already started.

To achieve the aim of the thesis a questionnaire was developed, on the base of which interviews were conducted in each village on a household level. The analysis of the WTE i.e. the intention of the households was based on the Theory of Planned Behavior (TPB). Binary Logistic Regression, Mann-Whitney U and Wilcoxon rank-sum non-parametric tests, Cross-tabulation and factor analysis were used

to analyze the collected data. For assessing the plots, costs for the reforestation of each plot were estimated and grouped by costs for the rehabilitation of the irrigation system, fencing and planting material.

The empirical results show that out of many other factors such as 'benefits expectations', 'social pressure', 'age' and 'income', the 'ability' of the household was the main predictor for enrollment in SBA in all villages. 'Ability' in turn is defined by availability of labor force and time as well as physical ability of the available labor force. The analysis of the respective plots shows, that financial costs for the reforestation of the plots vary, depending on the plot size, distance to fencing and planting material. The WTE of local people of each village and respective plot were weighted and the results suggest that out of the three plots and villages only one seems to be suitable for SBA implementation.

For the practical dissemination of SBA, the results mean that availability of labor force and time as well as physical ability of the labor force on the household level needs to be considered most. On the village level the size of the plot and the number of households which are willing to enroll has to be considered. For the plot, the investments costs per hectare need to be taken into account.

Резюме

Леса занимают важное место в жизни людей, особенно в развивающихся странах. Однако в настоящее время роль лесных экосистем недооценена. Состояние большей их части ухудшилось, либо они разрушены, и, следовательно, возможности лесов по «снабжению ресурсами» уменьшаются. Главным образом это является результатом неадекватного управления ресурсами, в которое не вовлечена основная целевая группа - местные жители. В ответ на возрастающую проблему снижения роли лесов были разработаны и опробованы подходы по совместному управлению лесами. Для защиты и восстановления прибрежных лесов Горного Бадахшана в Таджикистане Государственное учреждение лесного хозяйства (Лесхоз) в сотрудничестве с Германским Обществом по Международному Сотрудничеству (GIZ) с 2005 года начало осуществлять проект по Совместному Управлению Лесами (СУЛ), вовлекая местных жителей в управление лесами. Лесхоз как организация, отвечающая за управление государственными лесами, на основе подробно прописанного договора передает долгосрочное право собственности на лесные ресурсы местным жителям, которые зависят от лесов и которые в ответ помогают Лесхозу достигнуть целей по защите и восстановлению лесов. Шестилетний опыт применения СУЛ в Горном Бадахшане показал, что такой подход оказался подходящим инструментом для восстановления и устойчивого использования лесов, поскольку местные жители могут получать выгоду от участия. Однако в сильно деградированных лесах, где необходимы сравнительно высокие начальные инвестиции, СУЛ явно не будет работать. На таких территориях Лесхоз и GIZ недавно начали внедрять подход Сберегательной Книжки (СК) на экспериментальном участке площадью 20га. СК представляет собой вид Платежей за Услуги Экосистем (ПУЭ). Восстановление лесов на сильно деградированных участках арендаторов проекта СУЛ поддерживается Лесхозом, который выдает материалы для ограждения участков и посадки деревьев. Параллельно, в течение 6 лет Лесхоз выплачивает арендаторам компенсацию за работу. Арендаторы, участвующие в восстановлении участка, получают компенсацию в тот период, когда они еще не могут извлекать выгоду от участка в виде лесной продукции. Лесхоз и арендаторы разрабатывают достижимые ежегодные планы. После достижения ежегодных целей определенная сумма денег выдается арендатору со сберегательной книжки.

Для дальнейшего внедрения подхода необходим анализ факторов, которые влияют на решение местных жителей участвовать в подходе или нет. Цель этого исследования состояла в том, чтобы на уровне села определить факторы, влияющие на готовность местных жителей участвовать в подходе, а также выбрать лесной участок, подходящий с точки зрения размера инвестиций, необходимых для восстановления участка с применением подхода СК. Для этого в рамках исследования были выбраны три села и три участка в Горном Бадахшане. Дополнительно результаты, полученные в трех изученных селах, сравнивались с результатами на экспериментальном участке, где подход СК уже реализуется.

Чтобы достигнуть цели работы, был разработан вопросник, на основе которого проводились интервью в каждом селе на уровне домохозяйств. Анализ готовности домохозяйств участвовать в подходе проводился на основе Теории Запланированного Поведения (ТЗП). Для анализа собранных данных использовался метод Бинарной логистической регрессии, непараметрические тесты Манна - Уитни - Уилкоксона, поперечное табулирование и анализ факторов. Для того чтобы оценить пригодность участков для подхода СК, оценивались затраты каждого участка на восстановление лесов, которые также были сгруппированы с затратами на восстановление ирригационной системы, строительство ограждений и посадку деревьев.

Эмпирические результаты этой работы показывают, что среди многих других факторов, таких как ожидаемая польза, социальное давление, возраст и доход, во всех селах главной была способность домохозяйства участвовать в подходе СК. Эта способность в свою очередь определялась наличием рабочей силы, времени и физическими возможностями этой рабочей силы. Анализ соответствующих участков показывает, что финансовая стоимость восстановления лесных участков меняется в зависимости от площади участка и расстояния до материалов, необходимых для строительства ограждения и посадки деревьев. Была оценена готовность домохозяйств к участию в каждом селе и на соответствующих участках, и результаты показывают, что из трех участков и сел только один, подходит для реализации подхода СК. Для практического распространения подхода СК эти результаты означают, что в первую очередь нужно смотреть на наличие рабочей силы, времени и физические способности доступной рабочей силы на уровне домохозяйств. На уровне села необходимо рассматривать площадь участка и число домохозяйств, которые хотят участвовать в подходе СК. Что касается самого участка, нужно принимать во внимание площадь участка и сумму инвестиций на один гектар.

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¹Imam village is named after Imam Muhammad al Boqir, the 4th spiritual leader of Ismaili Muslims, who, due to some legends lived in a cavern in this village in 8th century. Untill today the cavern is perceived as a holy place (Kalandarov, 2011).

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Abbreviations

ACTED	Agency for Technical Cooperation and Development
ADB	Asian Development Bank
AKDN	Aga Khan Development Network
AKF	Aga Khan Foundation
APO	Annual Plans of Operation
ASSR	Autonomous Soviet Socialist Republic
BLR	Binary Logistic Regression
CEP	Committee on Environmental Protection under the Government of the Republic of Tajikistan
ES	Ecosystem Services
EUR	Euro
FRA	Forest Resources Assessment
GBAO	Gorno Badakhshan Autonomous Oblast
GIS	Geographic Information System
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
JFM	Joint Forest Management
KfW	Kreditanstalt für Wiederaufbau
KSU	Khorog State University
MA	Millennium Ecosystem Assessment
MSDSP	Mountain Society Development and Support Programme of the Aga Khan Foundation
NBT	National Bank of Tajikistan
NTFP	Non-timber forest product
PES	Payments for Ecosystem Services
RT	Republic of Tajikistan
SBA	Saving Book Approach
SDFH	State Department for Forestry and Hunting
SFA	State Forest Agency
SFE	State Forest Enterprise
SPSS	Statistical Package for the Social Sciences
TEEB	The Economics of Ecosystems and Biodiversity
TJS	National currency of Tajikistan
TPB	Theory of Planned Behaviour
UCA	University of Central Asia
UN	United Nations
UNDP	United Nations Development Program
UNEP	United Nations Environmental Program
UN-WFP	United Nations World Food Programme
USSR	Union of the Socialist Soviet Republic
VO	Village Organization
WTE	Willingness to Enroll
WTP	Willingness to Participate

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1 Introduction

1.1 Theories of forests management and their services

1.1.1 Participatory approaches for forest management

Dependence of people on forest resources

Roughly 8,000 years ago, forests covered around 6.2 billion hectares, roughly 47% of Earth's surface (MA, 2005b). The most recent and comprehensive assessment of global forest cover was done in 2010 by the Global Forest Resources Assessment (FRA) under the Food and Agriculture Organization (FAO) of the United Nations. According to FRA (2010), the world's current total forest area is around 4 billion hectares and covers 31% of Earth's surface. These remaining forests are suffering from various degrees of degradation. This loss of forest cover and current degradation are driven by a combination of economic, social, political and institutional factors (Bryant et al, 1997; MA, 2005b). Although the vicious cause and effect cycle of forest degradation seems difficult to break (Contreras, 2000), it is evident that forests provide fundamental functions that are necessary for the survival of local people especially in developing countries (MA, 2005b; Vemuri, 2008). Several studies have shown that the dependence of local people on forest resources and that a lack of alternatives can perpetuate poverty (Neumann and Hirsch, 2000; Pattanayak and Sills, 2001; Sunderlin et al., 2005). Although Kaimowitz and Angelsen (1998) concluded in their review that "it is hard to find any clear-cut relationship between macroeconomic variables and policies and deforestation", recent literature underlines a clear historical relationship between economic development and changes in forest cover (Rudel, 1998; Angelsen and Wunder, 2003). Such an example may include, the conversion of forest to agricultural land might provide a higher income.

Joint Forest Management (JFM)

Changes in forest cover directly depend on the way forests are managed. Similar to fisheries or wildlife, also forests tend to be a common property resource. This has important implications for their management. Two features characterize such common property resources (Feeney et al., 1990):

- Problems of exclusion or control of access of users. It is very costly or even impossible to exclude potential users from the use of the resource.
- Subtratability, meaning any user is capable of subtracting from the benefit of other users.

In order to tackle the inherent challenges of sustainable management of common property resources, participatory community based management approaches have been proposed and tested.

There is a growing body of literature on the successful implementation of community-based forest management programs in Asia as well as globally. Case studies have been carried out in the Philippines, China, Nepal, India, Vietnam, Kyrgyzstan and Tajikistan (Carter et al., 2003; Mustalahti, 2009; Bhattacharya et al., 2010; Evans et al., 2010; Kirchhoff, 2010). Similar programs have been implemented in other parts of the world, such as Bolivia, New Zealand, Tanzania and Mozambique (Mustalahti, 2009; Evans et al., 2010; Sheeladitya and Chakrabarti, 2011).

Forest management in India can be seen as a pioneer of community-based forest management and related participatory approaches. The history of forest management is characterized by conflicts between traditional rights of forest users and decades of British colonial legacy (Rishi, 2002; Vemuri, 2008). Not long ago the government realized that its policy of managing India's vast forest areas was neither for the benefit of the countries environmental objectives nor of the local people (Rishi, 2002). In 1988, the Joint Forest Management (JFM) approach was introduced in India, as a participatory tool to conserve and manage forests in a sustainable way (Rishi, 2007). The JFM approach in India is described as "a forest management strategy under which the government represented by the Forest Department and the village community enter into an agreement to jointly protect and manage forestlands adjoining villages and to share responsibilities and benefits" (Vemuri, 2008).

Based on the positive experiences with JFM implementation in India it is considered as one of the most successful approaches to manage forests to date. However, there is a concern that it has failed to take into account the socio-economic factors of stakeholders such as caste, class, tribe, religion and/or ethnicity gender and age (Sheeladitya and Chakrabarti, 2011). Sheeladitya and Chakrabarti (2011) showed in their study that tribal populations, who are some of the poorest people in India, prefer to protect the forest by being a stakeholder of JFM approach. Some critics see JFM as a tool of power of the Forest Department and argue that there is injustice in distribution of power between the two parties (Sundar, 2000; Murali et al., 2003). Others argue for national organizations for total community control. In summary, "both views have some truth, and it would perhaps be better to see community management of resources today as a double-edged sword" (Sundar, 2000).

The Saving Book Approach (SBA)

Despite this criticism, JFM and similar approaches seem relevant for forest management where all stakeholders benefit from their participation. However, the question arises: what if the concerned forest areas are already overexploited, undervalued or destroyed and have no immediate benefits to the users anymore²? Many debates about the need for new participatory conservation approaches have emerged in the last few decades. At the center of these calls for more direct conservation approaches is the concept of Payments for Ecosystem Services (PES) (Ferraro and Kiss 2002; Bawa et al. 2004; Berkes 2004; Romero and Andrade 2004; Wunder, 2005; Engel et al., 2008; Forest Trends, The Katoomba Group and UNEP, 2008). Thus, PES combine the participatory approach with the idea of financial compensation (Pirard et al., 2010) (see 1.1.3).

Despite the fact that it was already developed in 1995, the Saving Book Approach, which was successfully implemented by a project of Deutsche Kreditanstalt für Wiederaufbau (KfW) in Vietnam, can serve as an example for this discussion. The Project's general objective was to contribute to afforestation and soil conservation in the northern Provinces of Bac Giang, Quang Ninh and Lang Son. The scope included the afforestation of a total of ca. 15,500 hectares of bare lands and its management

² Decisions of using resources are often focused on immediate benefits.

after planting. The centerpiece of the Project's design was the establishment of deposit accounts for farmer participation in planting and maintenance. Each interested farmer obtained an area between 1 and 2 hectares for afforestation. The allocation of land was certified through the so-called Red Book Certificate, providing the needed land tenure security. At the same time a deposit book was established under the farmer's name at a rural bank and the amount of US\$ 200-250 (depending on species and plot size) was credited under the farmer's name. In relation to the average per capita income in the region, which varies from 150 - 200 US\$ per year, the saving deposit is a sufficient incentive to involve the farmer in forestry activities.

Farmer's contributions included the preparation of the plantation site, planting of saplings and maintenance of the plantation. Seedlings were provided free of charge and the provincial and district forestry authorities advised farmers through the Project's extension service on technical matters such as site/species matching, and the use of fertilizer.

Depending on the compliance with the agreed management procedures, the holder of the deposit account received limited access to the account for a period of nine years. During the first two years, after completed planting, the holder of the deposit account could withdraw 15% of the principal amount plus interest earnings. The remaining amount plus interest earnings for each year could be withdrawn by the farmer during the following 7 years once a year and at times of highest cash income needs. However, due to the high labor input at the beginning of plantation establishment, payments of the deposit accounts did not fully compensate the farmer's labor input during the first two years. Payments from the saving deposit, however, exceed labor needs during the subsequent years, which are often critical for plantation success. The household's performance in forest management was regularly checked by the forestry authorities in the presence of representatives of the village. Non-observance of forest management regulations and procedures will result in a delay of payments from the deposit account and/or even in a closure of the deposit account (Kirchhoff and Fabian, 2009).

1.1.2 Ecosystem Services of forests

Definition and classification

SBA serves as one of the PES-like schemes for forest management. However, before going into the description of the PES concept itself, a definition of the term ecosystem and Ecosystem Services (ES), as well as the ES of forests, are described. There are numerous definitions of the term ecosystem and it is difficult to find consensus in this issue. The most comprehensive assessment of ecosystems and ES to date has been done by the Millennium Ecosystem Assessment (MA)³, which has involved the work of more than 1,360 experts from 95 countries. According to MA "an ecosystem is a dynamic complex of plant, animal, and microorganism communities and the non-living environment, interacting as a

³ The MA was officially launched by United Nations (UN) Secretary-General Kofi Annan in 2001. The objective was to assess the consequences of ecosystem change for human well-being and the scientific basis for action needed to enhance the conservation and sustainable use of those systems as well as their contribution to human well-being. MA's findings include five technical volumes and six synthesis reports. They provide a state-of-the-art of the condition and trends in the world's ecosystems and the services they provide. The duration of MA was 4 years, between 2001 and 2005 (MA, 2005).

functional unit. Humans are an integral part of ecosystems”. Thus, it provides human beings with a wide range of goods and services, from raw material inputs, to production processes and climate stability (MA, 2005a; MA, 2005b).

ES in a broad and simple definition can be explained as benefits, which people obtain from ecosystems (MA, 2005a). However, this definition is derived from two more complex definitions (MA, 2005a): “Ecosystem services are the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfill human life. They maintain biodiversity and the production of ecosystem goods, such as seafood, forage, timber, biomass fuels, natural fiber, and many pharmaceuticals, industrial products, and their precursors. Ecosystem goods (such as food) and services (such as waste assimilation) represent the benefits human populations derive, directly or indirectly, from ecosystem functions” (MA, 2005a). Although the term ‘services’ encompasses both the tangible and the intangible benefits humans obtain from ecosystems, sometimes it is separated into ‘goods’ and ‘services’ respectively. In economics, it is applied in both ways: referring to goods and services separately or including the two concepts under the term services. However, under MA goods and services are defined together as ‘ecosystem services’ because at times it is difficult to define whether a benefit is a ‘good’ or a ‘service’. All ES which are categorized within the MA include: provisioning, regulating, cultural, and supporting services (MA, 2005a) (see Fig. 1).

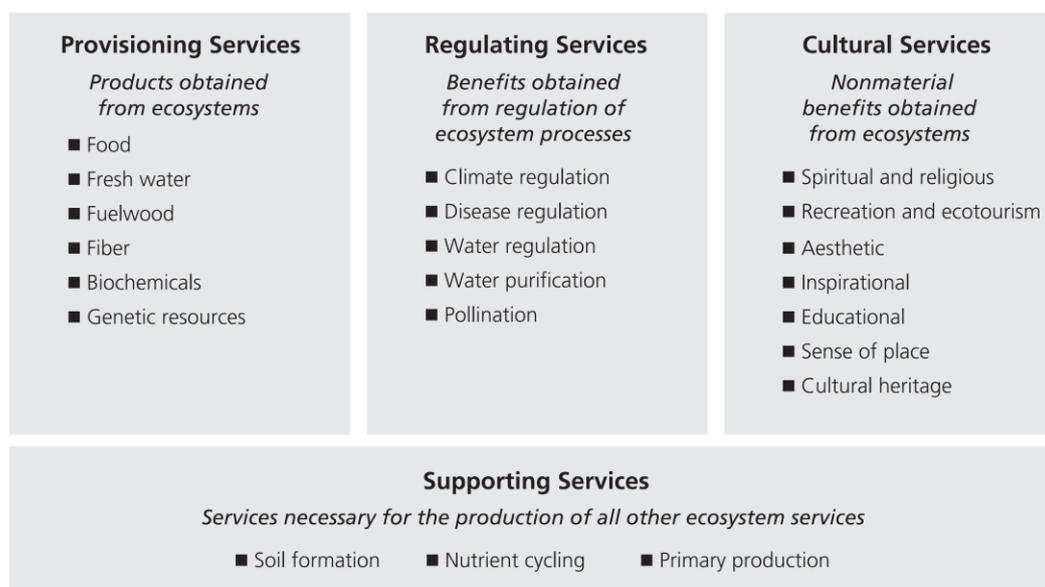


Fig. 1: Categorized Ecosystem Services. MA, 2005a.

In contrast to MA, Boyd and Banzhaf (2007) employ more narrow definitions for specific accounting and decision making. Wallace (2007) attempted to clarify the definition of ES and developed an alternative system of classifying ES. Each definition differs according to its emphasis on the supply and/or demand side, market and non-market services, temporal and spatial scale, units of measurement and so forth (Patterson and Coelho, 2009). After several efforts there has not been an agreement on consistent definition for ES (Fisher et al., 2009).

ES have become an important area of research at present due to the increasing destruction of ecosystems globally (Fisher et al., 2009; Patterson and Coelho, 2009). The number of scientific papers addressing ‘ecosystem services’ or ‘ecological services’ in the ISI Web of Science alone is rising exponentially. Although there were no scientific papers in the early 1990s, in 2008 there were already 250 (Fisher et al., 2009).

The concept of ES describes the links between nature and the economy. It can help to recognize the numerous benefits that nature provides to humans. “From an economic point of view, the flows of ecosystem services can be seen as the ‘dividend’ that society receives from natural capital” (TEEB, 2010a). However the “economic assessment should be seen as a tool to guide biodiversity management, not as a precondition for taking action” (TEEB, 2010a). Economic valuation of ecosystems at different scales has been conducted by The Economics of Ecosystems and Biodiversity study (TEEB)⁴ which “synthesizes state-of-the-art knowledge on the main concepts, methods and tools for valuation [...]” (TEEB, 2010b). A basic idea behind the TEEB study is that the valuation of biodiversity and ES needs to be developed according to the specific situation (TEEB, 2010b).

Ecosystem Services of forests

“Forest ecosystems are extremely important refuges for terrestrial biodiversity, a central component of Earth’s biogeochemical systems, and a source of ecosystem services essential for human well-being” (MA 2005b). From an anthropogenic point of view, the ES of forests include both forest products, or goods (e.g. timber and non-timber forest products) and services (e.g. water regulation and erosion control) which humans receive from ecosystems. Thus, forests and their services cannot be distinguished from any human context (Nasi et al., 2002).

The ES of forests are manifold at all spatial and temporal levels. Forests provide goods, regulate local and global climate, buffer weather events, regulate the hydrological cycle, protect watersheds and their vegetation, water flows and soils, provide a vast store of genetic information and have cultural and aesthetic value. There are many economic approaches used for the estimation of the value of some forest services, mostly the those related to provisioning and entering formal markets (although there are also markets developing for carbon and biodiversity). These approaches provide awareness on the importance of forests for people. Many researchers successfully apply monetary values – even to nonmarketable services. However, it should be mentioned that no consistent methodology for the economical estimation for these forest services is applied (MA, 2005b).

⁴The TEEB study is launched by United Nations Environment Programme (UNEP) with financial support from the European Commission, Germany, the United Kingdom, Netherlands, Norway, Sweden and Japan. The aim of TEEB is to synthesize and present the latest ecological and economic knowledge of ES, to develop guidance for policy makers at all levels and to raise public awareness of the contribution of ES and biodiversity towards human welfare TEEB started in 2007 and the synthesis report is finalized 2010 (TEEB, 2010a).

1.1.3 Payments for Ecosystem Services

At present ES are undervalued, widely deteriorating or destroyed, thus their ‘supply’ is decreasing. Therefore, many ecosystem structures and services are being fundamentally undercut. In response to growing concerns of present environmental problems, markets are emerging for specific ES, thus the emergence of PES is concurrent with the need to maintain ES (MA, 2005b; Forest Trends, The Katoomba Group and UNEP, 2008; Pirard et al., 2010). PES is being applied to sustain and maintain particular ES that ecosystems provide (Forest Trends, The Katoomba Group and UNEP, 2008). Furthermore, PES is becoming increasingly popular as a method for the management of ecosystems using economic incentives (Farley and Costanza, 2010). However, there have been remarkably few efforts regarding the definition of the term itself (Engel et al., 2008). The critical defining factor of what constitutes a PES is not just the money paid for an ES delivered, “rather, the key is that the payment causes the benefit to occur where it would not have otherwise” (Forest Trends, The Katoomba Group and UNEP, 2008). Wunder (2005) defines PES as:

1. a voluntary transaction where
2. a well-defined ES (or a land-use likely to secure that service)
3. is being ‘bought’ by a (minimum one) ES buyer
4. from a (minimum one) ES provider
5. if and only if the ES provider secures ES provision (conditionality).

The basic logic of PES mechanisms is shown in Fig. 2. “Ecosystem managers, whether they be farmers, loggers, or protected area managers, often receive few benefits from land uses such as, for example, forest conservation. These benefits are frequently less than the benefits they would receive from alternative land uses, such as conversion to cropland or pasture. However, deforestation can impose costs on downstream populations, who no longer receive the benefits of services such as water filtration, and on the global community, because of reductions in biodiversity and carbon storage (the actual impacts will, of course, vary from case to case). Payments by the service users can help make conservation the more attractive option for ecosystem managers, thus inducing them to adopt it (or, in the case of protected area managers, giving them the resources to do so)” (Engel et al., 2008).

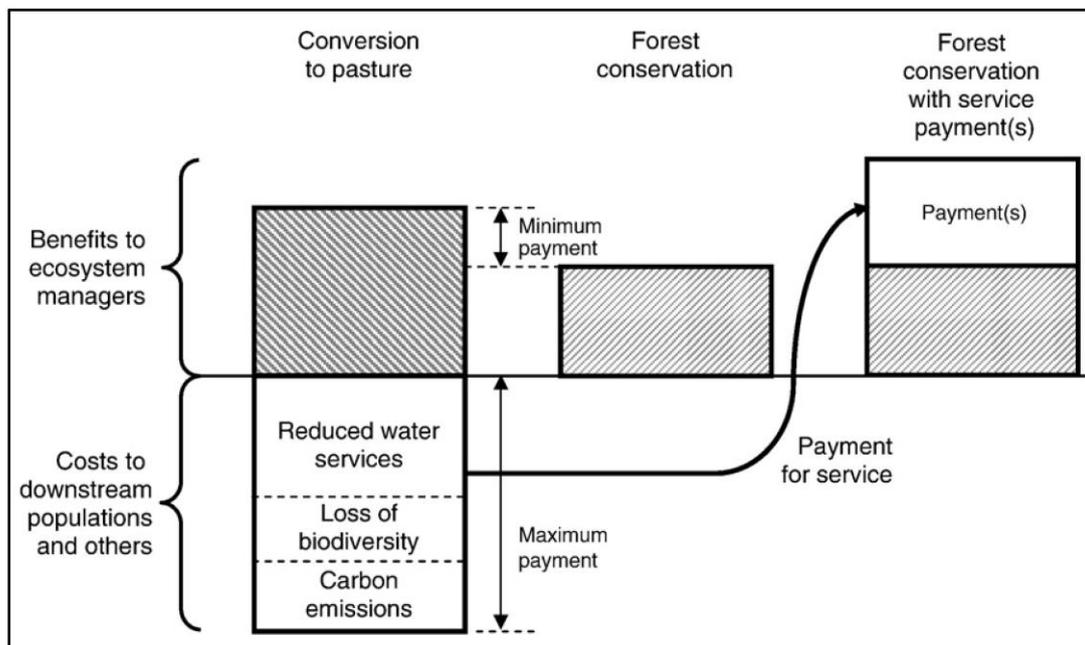


Fig. 2: Payments for environmental services scheme. Engel et al. 2008.

PES are by no means limited to forests. Schemes or mechanisms of PES develop in particular environmental, economic, social and political contexts. They are not created in a vacuum by social planners or economic theorists but rather “[...] subject to the push and pull of many stakeholders” (Engel et al., 2008).

The main actors of PES are the ‘buyers’ and the ‘sellers’. According to Engel et al. (2008) there is a distinction between cases

- where the ‘buyers’ are the actual users of the ES or
- where the ‘buyers’ are others (typically the government, an NGO, or an international agency) acting on behalf of the users of the ES.

Numerous studies point to the advantages of PES. PES are widely applied for conservation purposes (Niesten et al., 2004) and forest-carbon plantations (Smith and Scherr, 2002). Costa Rica (Russo and Gandela, 2006; Pagiola, 2008), Mexico (Muñoz-Piña et al., 2008; Corbera et al., 2009), Nicaragua (Van Hecken and Bastiaensen, 2010), Europe and the USA (Claassen et al., 2008; Dobbs and Pretty, 2008; Baylis et al., 2008) and China (Zhang et al., 2010) give examples of PES in action. Although PES schemes offer more efficient, sustainable and mutually beneficial arrangements between environmental-service providers and users (Robertson and Wunder, 2005), their impacts, in practice, are yet to be determined (Gutman, 2003). Based on the concept and theory of PES so far defined in the literature, Pirard et al. (2010) stimulate a debate on PES in order to improve the understanding of mechanisms and to examine the real contribution of it to conservation efforts in the field. Their main conclusion of this hypothetical debate is that: “there is a strong disconnect between economic valuations of ecosystem services and the design of PES” (Pirard et al., 2010). Later this statement was tested in four Indonesian sites. The results showed that there is a significant gap between PES theory and practical implementation (e.g. none of the case studies point towards a PES according to the classical definition of Wunder (2005)

or there is a total absence of economic assessment of environmental services) (Pirard and Billé, 2010). This fact shows that PES schemes might not be appropriate or applicable for solving all environmental problems. As Engel et al. (2008) state: “PES is not a silver bullet that can be used to address any environmental problem, but a tool tailored to address a specific set of problems: those in which ecosystems are mismanaged because many of their benefits are externalities from the perspective of ecosystem managers”.

1.1.4 Decision making process - the Theory of Planned Behavior

Although there are many doubts related to PES (see 1.1.3), but they seem to be the most well defined concept for preserving ES of forests to date. Voluntary participation of stakeholders in PES schemes for forest protection, rehabilitation and use is influenced by different factors. By applying the Theory of Planned Behavior (TPB), the influential factors of participation of local people in forest management can be analyzed and determined.

The TPB attempts to understand and predict human behavior. Although most assumptions of the theory have been questioned (Beedell and Rehman, 1999), empirical evidence shows that the theory is useful as a standardized tool in explaining human behavior. TPB is commonly used in different fields of science (Carr and Tait, 1990; Lynne et al., 1995; Beedell and Rehman, 1999; Beedell and Rehman, 2000; Pouta and Rekola, 2001; Burton, 2004; Fielding et al., 2005; Edwards, 2006; Koellner et al., 2010). According to this theory, an intention is the most important determinant of an individual’s behavior (Fielding et al., 2005). Intention, in turn, can be predicted by measuring the underlying determinants of the behavior: attitudes, subjective norms and perceived behavioral control (Beedell and Rehman, 1999) (see Fig. 3). Attitudes are beliefs about the likely outcomes of the behavior and the evaluations of these outcomes (e.g. planting trees in the forest provides me with fuel wood). Subjective norms are beliefs about the normative expectations of others and motivate one to comply with these expectations (e.g. my family members think that I have to plant trees in the forest). Behavioral control is made up by beliefs about the presence of factors that may facilitate performance of the behaviour and the perceived power of these (e.g. I cannot plant trees in the forest because I am physically not able to do so) (Ajzen, 2002).

The central assumption of TPB is that people behave rationally according to their beliefs. Therefore a person’s behavior is a result of the beliefs that he/she has. The beliefs may be based on experience, fact, hearsay or may be misleading (e.g. influences of policy, society, family, friends, peers, the media and so forth) (Beedell and Rehman, 1999). “As a general rule, the more favorable the attitude and subjective norm, and the greater the perceived control, the stronger should be the person’s intention to perform the behavior” (Ajzen, 2002).

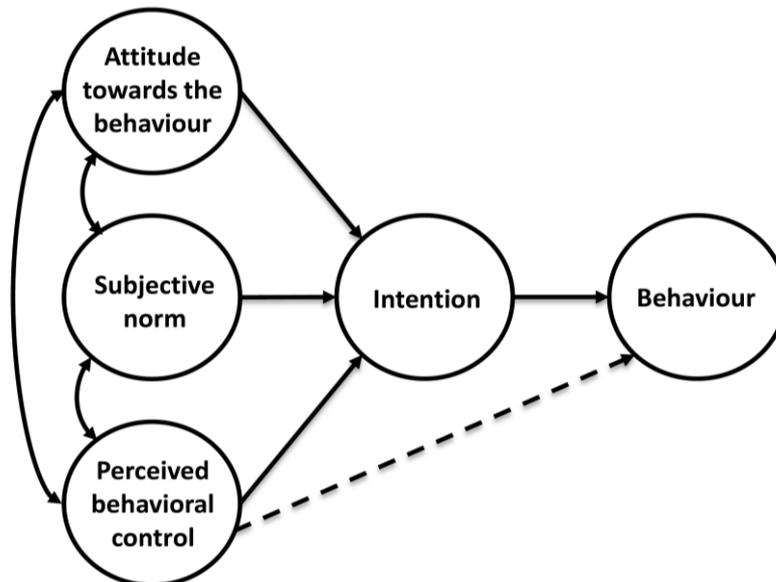


Fig. 3: Model of the Theory of Planned Behavior. Ajzen, 1991

1.2 Physical and socio-economic characteristics of Gorno-Badakhshan, Tajikistan

1.2.1 Physical characteristics of Tajikistan

The Gorno Badakhshan Autonomous Oblast (GBAO) is the Province of the Republic of Tajikistan, where the current research was carried out. The Republic of Tajikistan (RT) is a landlocked country, located in the south-eastern part of Central Asia and shares borders with Afghanistan, Uzbekistan, Kyrgyzstan, and the People's Republic of China. Its total area is 143,100km², 93% of which is covered by high mountains. At its' widest point, it stretches 700km across from east to west and spans 350km from north to south. Almost 50% of the area is located at an elevation of more than 3000masl (UNDP, 2008; Kirchhoff, 2010; Romer, 2005). Tajikistan is divided into four administrative regions: Sughd and Khatlon, the Autonomous Oblast of Gorno Badakhshan and the Region of Republican Subordination. Each region in turn is divided into several districts. Dushanbe is the capital of the country.

The climate in Tajikistan encompasses zones with continental, subtropical, semiarid and arid climate. It varies drastically according to elevation. In the south-western part of Tajikistan the average temperature ranges from 23° C to 30°C in July and from 1°C to 3°C in January, whereas in the Eastern Pamirs the average July temperature varies between 8°C and 12°C and January's absolute minimum temperature can reach -40°C to -45°C (UNDP, 2008; Kirchhoff, 2010; Vanselow, 2011).

1.2.2 Physical characteristics of Gorno-Badakhshan

The Pamir Mountains are located in Central Asia. The heart of these mountains are situated in Tajikistan, namely in the *Tajik Pamirs*⁵. Smaller parts of the Pamirs extend over Afghanistan, China and Kyrgystan. The Pamir Mountains are surrounded by the Tien-Shan, Alai and Kunlun-Shan (Vanselow, 2011). Hence,

⁵The Tajik Pamirs used interchangeably with Gorno Badakhshan, Gorno Badakhshan Autonomous Oblast and Gorno Badakhshan. Gorno Badakhshan Autonomous Oblast (GBAO) is the political or administrative unit.

the region is also known as the “Pamirian Knot” (Kreutzmann, 2003) or “The Roof of the World” since world’s highest mountain ranges are located here (Breu and Hurni, 2003). Gorno Badakhshan comprises about 64,000km² which accounts for 44.6% of the total land area of Tajikistan (Aknazarov and Melnichkov, 2006). It is administratively divided into seven districts: Darvaz, Vanj, Rushan, Shugnan, Roshtkala, Ishkashim and Murgab. The capital of the region is Khorog (see Fig. 16).

The climate of the Gorno Badakhshan differs from the average climatic conditions of Central Asia. The high altitude has a direct impact on the climate in the region. It is characterized by lower temperatures, dry air and a high diversity of microclimatic conditions. The considerable dryness is caused by its remoteness from oceans and large surface waters. High mountain ranges in the north and the south form a ‘natural barrier’ for the flow of moist air, thus creating a continental climate (Muhabbatov and Khonaliev, 2005). According to the climate and geology one must distinguish between the Western and the Eastern Pamirs. Table 1 shows the main physio-geographical differences between the Eastern and Western parts (Hergarten, 2004).

Table 1: Physio-geographical characteristics of Western and Eastern Pamirs (adapted from Hergarten, 2004 and Vanselow, 2011).		
	Western Pamirs	Eastern Pamirs
Surface	30,827 km ²	33,105 km ²
Altitudes of 3.000m – 5.000masl	76% of the surface	89% of the surface
Average annual precipitation	100-300mm	70-120mm
Annual average temperature	In the valleys in the range of 1.0-9.6°C and at an altitude of over 3,000 (-3°C)	-1°C to -2.8°C
July average temperature	at 2,000m 24°C, at 2,000 - 3,000m 18 to 20°C, at 3,000 - 4,000m ≥8°C	8°C to 12°C
January average temperature	in the valleys (-2) – (-8)°C, in the high mountains (about 4,000m) (-15) – (-20)°C	-20°C or less

The Eastern Pamirs cover a wide and high mountainous plateau, with an area of about 33,000km². The landscape is characterized by very wide and flat valley-bottoms (10 – 15km wide) between elevations of 3500masl and 4000masl. The tops of the mountains reach 6,000masl. (Hergarten, 2004; Vanselow, 2011). Due to these high altitudes, no forests grow in the Eastern Pamirs. The vegetation of the Eastern Pamirs is mainly characterized by species which are adapted to a cold and arid climate. These include first of all bushes and semi-bushes. (Mullo Abdol, 2003). A dominating plant is *teresken*⁶, *Krascheninnikovia ceratoides*, which grows at elevations between 3500masl and 4200masl (Vanselow, 2011).

The Western Pamirs have a completely different physio-geographical character compared to the Eastern Pamirs (see Fig. 4 and Fig. 5). The area consists of rocks and very steep slopes. The main topographical feature of the Western Pamirs is deeply incised valleys along the river Panj. This river also marks the state border to Afghanistan. Forests in the Western Pamirs are mainly located along the riverbanks.

⁶ *Teresken* is a “shrubby plant belonging to the family of *Chenopodiaceae*. There are several scientific names for *teresken*: as *Eurotia ceratoides*, *Ceratoides papposa* and *Krascheninnikovia ceratoides*” (Droux and Hoeck, 2005).



Fig. 4: Eastern Pamirs. Photo: Mislimshoeva, 2009



Fig. 5: Western Pamirs. Photo: Mislimshoeva, 2011

1.2.3 Socio-economic characteristics of Tajikistan

Before the Soviet system, the territory of what is today Tajikistan, belonged to the Emirate of Bukhara. After the Bolshevik invasion in 1917 it became part of the Autonomous Soviet Socialist Republic (ASSR) of Turkestan. In 1929 Tajikistan became a federal Soviet Republic⁷ (Middleton, 2003; Hergarten, 2004). Its role in the Soviet system was straightforward: the northern part was the industrial center, namely due to the hydro-power potential for aluminium production; the south-western part was used for cotton production; Gorno Badakhshan was strategically important for the protection of the border to Afghanistan and China, therefore it did not have significant production (Breu and Hurni, 2003).

On the 9th of September 1991 Tajikistan became an independent country after having been one of the republics of the Soviet Union for almost 70 years. Between 1992 and 1997 Tajikistan experienced a brutal civil war causing tremendous physical damage and human losses (UNDP, 2008). This war started as a result of a power struggle between different political parties and regional groups (Herbers, 2001). A peace agreement between the Government of Tajikistan and the United Tajik Opposition, signed in 1997, put an end to the fighting and brought relative political stability to the people (ICG, 2001; Middleton, 2003). However, since Tajikistan was known for being the poorest Soviet republic before 1991, and as it had been very dependent on external support, the transition process began with many difficulties (ICG, 2001; Herbers, 2001).

As a result of the civil war, Tajikistan's economy has been seriously weakened. It is dominated by major export commodities, i.e. aluminum and cotton (ADB, 2010). Although most of Tajikistan's rural households largely depend on forest products, such as construction and fuel wood as well as other non-timber forest products, the forestry sector is currently underdeveloped and does not play an important role in the economy (see 1.3). The most important factor for socio-economic stability in Tajikistan is the remittances from labor migrants from abroad. "According to unofficial estimates, internal living conditions cause around 1.5 million Tajik citizens to work and live outside the country, women constituting one third of all migrants" (CACI Analyst, 2008). They regularly send money to their families

⁷In these division periods today's Tajikistan experienced a mixing of ethnic groups (Kassam, 2009) as well a nation-splitting phase to ensure the strong power of the Soviet Union (Hergarten, 2004).

in Tajikistan. For most of the households in Tajikistan, these remittances are the main source of income (CACI Analyst, 2008). In total, 96% of the migrants head to Russia, where 55% work in the construction sector and another 30% in other low-skilled occupations (Danzer and Ivaschenko, 2010). In 2010 more than 24,700⁸ residents of Gorno Badakhshan were employed or living outside of the country. This makes up more than 10% of the total population of the region. More than 50% (13,200 people) of them were young people, between 18 to 30 years old (AP, 2010). According to the Oxford Poverty and Human Development Initiative (2010) 51% of the population⁹ of Tajikistan lives below the \$2.00 a day poverty line.

Tajikistan's total population according to Statistical Committee of Tajikistan (2011) is 7.612 million people. Tajiks are culturally, linguistically and ethnically closely related to the Persians. The population of the RT is made up by 80% Tajiks and 15% Uzbeks. By religion, Tajiks are mainly Muslims: 85% are Sunni Muslims, 5% are Shia Ismaili Muslims (LoC, 2007). Pamiris in Gorno Badakhshan belong to the Ismaili branch of Islam (Shia) and follow the spiritual leader His Highness the Aga Khan¹⁰ (Middleton, 2003). The country's official language is Tajik. The languages spoken in most districts of Gorno Badakhshan differ from the Tajik language. They include Shughni, Rushani, Yazgulami, Wakhi and other dialects of Eastern Iranian languages.

1.2.4 Socio-economic characteristics of Gorno Badakhshan in transition

Feudal lord, pure nature, plow and bulls

Before the Soviet system the territory of today's Gorno Badakhshan in every respect was one of the poorest regions in Central Asia. A short fragment from Cherkasov's¹¹ report, who visited Gorno Badakhshan in 1904, confirms that "[...] when entering the area settled by mountaineers, poverty of the population can be seen first of all with the view of its fields. Between granite rocks [] there are pieces of the cultivated soil, sowed by barley. The soil is thin, sandy and mixed with stones [...]" (Muhabbatov and Khonaliev, 2005).

Farming was the main occupation of the local population and livestock breeding was of the second most importance in the Western Pamirs. In the Eastern Pamirs livestock breeding was in the first place due to the harsh natural conditions. As well as in other areas of Central Asia, the land here was the property of a feudal lord. There were also common lands - meadows, pastures, forests and spots for nomads during winter time (Nijozmamadov, 2005a).

In spite of many rich rivers and rivulets, people struggled a lot to bring sufficient water to the agricultural land due to a lack of appropriate technique. The limited land was cultivated using a traditional method, where a plough with a hooked iron tip was attached to two bulls. Due to the limited land area, local

⁸More than 18,600 men and 6,000 women (AP, 2010).

⁹The population was 6,7 millions in 2009 (OPHI, 2009).

¹⁰The Aga Khan or Imam is the religious leader of the Ismaili Muslims. Apart of being the religious leader he "[...] took responsibility for Russians, Sunnis and Shias alike, and the diverse ethnic groups in Badakhshan by providing emergency aid and establishing development organizations" after the independence of Tajikistan (Kassam, 2009).

¹¹Russian political agents sent Cherkasov A. A. to the Pamirs on "fact-finding mission" from 1904 to 1906 (Bergne, 2007).

people were forced to maximize its use, even in the most remote areas, deep in the mountains. Industry, transport, construction, communication, and any other public services were completely absent. Among the population only wooden, leather and felt crafts were used to fulfill daily household needs (Nijozmamadov, 2005a).

From feudal lord to Stalin's regime

The Soviet system in the Pamirs was affirmed at the end of June 1920. By a decision of the Central Committee of the Communist Party of the Soviet Union on January 2nd, 1925 the Gorno Badakhshan Autonomous Oblast as a part of Tajik ASSR was formed (Iskandarov, 2008). By 1933, 40 small state trade enterprises were established. In 1930-1940 considerable development was achieved by the enterprises of the local industry – sewing and leather. The construction of some small hydropower stations were the biggest achievements at that time (Muhabbatov and Khonaliev, 2005).

From the very first days after the formation of the Autonomous Oblast the question of transport was a main issue. Between 1932 and 1940 the highways Dushanbe – Khorog and Khorog – Osh were opened¹² (Zibung, 2003). On the highway Osh – Khorog, aside from products of daily consumption also coal, oil products and building materials were imported (Muhabbatov and Khonaliev, 2005). The land management system changed completely. According to the communist ideology, private land ownership was eliminated (Herbers, 2001). All smallholder farms existing before 1917 were merged into *kolkhozes*¹³ and *sovkhoses*¹⁴ (Hergarten, 2004). In the middle of 1935 there were 20 *kolkhozes* in Gorno Badakhshan (Nijozmamadov, 2005b). The government assisted the development of the *kolkhoz's* movement. The victory of the *kolkhoz's* system allowed for a considerable increase in the agricultural production level in a short amount of time. Potatoes harvesting increased almost tenfold, harvests of vegetables and fruit increased even more (Nijozmamadov, 2005b).

Despite industrial development, agriculture has remained the leading economic sector for the economy in Gorno Badakhshan (Muhabbatov and Khonaliev, 2005). However, self-sufficient household agriculture was replaced by industrial scale massive production via collectivization and mechanization. Consequently, local seed varieties and knowledge of how to cultivate them were lost in some regions (Kassam, 2009).

When the Soviet power was established, huge forest areas in Tajikistan were cut down in order to make more land available for cotton production. However, late in the Soviet period the state recognized the negative impacts of large-scale deforestation, prohibited further cutting of forests and declared them as protected areas. The demand for timber and fuel wood was replaced by an import from Siberia. This had a very positive effect on the management of the few remaining forests in Tajikistan (see 1.2.4). Annual Plans of Operation (APOs) were developed to manage and protect the remaining forests not only in

¹² The price of this achievement was the loss of many human lives.

¹³ A *kolkhoz* was a collective farm. This means that the land itself, the capital and the income belonged to the workers. Workers chose the chairman of the *kolkhoz*. The income of the workers depended on the profit they made (Herbers, 2001).

¹⁴ A *sovkhos* was a state farm. The land and all other property belonged to the state. The workers were employees of the state with fixed salaries independent of the *Sovkhos's* profit. The chairman was selected by the state (Herbers, 2001).

Gorno Badakhshan but also the rest of the country. APOs were developed and implemented for a period of 10 years. Accordingly, they were updated each 10 years and were the most important instruments for forest management. These plans were based on the principles of sustainable management. “This means that forest inventories, forest-management plans and a control system tailored to local conditions guided the forest managers, who used APOs to implement all the necessary measures” (Kirchhoff, 2010). Culturally it is accepted that forestry has been the profession of men in the villages even before the Soviet times. Women were/are usually not involved in this issue.

The introduction of an obligatory seven-year school education was the first step of developing education system in the region. By 1950 seven-year schools were established in almost all villages (Nijozmamadov, 2005b). Women had the same status as men and occupied high positions in the government. The cultural life was highly developed; there were cinemas and theaters often even at the village level (Breu and Hurni, 2003). Almost all households were equipped with television, radio, telephone, and to possess a private car became common (Breu and Hurni, 2003).

The long walk from the subsidized Soviet system to new ways of survival

In 1991, the collapse of the Soviet Union affected all levels of society in the Tajik Pamirs (Herbers, 2001). The external supply of resources, goods and services abruptly ended (Nijozmamadov, 2005b). The situation became more catastrophic by the inflow of 55,000 refugees in Gorno Badakhshan during the subsequent civil war (Droux and Hoeck, 2005). The complete dependence of the Tajik Pamirs on the Soviet Union left local people dependent on external supply. Humanitarian aid had to be provided by international organizations, such as Aga Khan Development Network (AKDN)/Aga Khan Foundation (AKF), Agency for Technical Cooperation and Development (ACTED), United Nations-World Food Programme (UN-WFP) and others to prevent humanitarian disaster in the region (Breu and Hurni, 2003; Hergarten, 2004).

Economic crisis and lack of fuel supply (see Fig. 6) as well as limited fodder for livestock led to an enormously increased pressure on the scarce natural resources in the region. Moreover, the existing forest management system practically collapsed. APOs were no longer functioning, data management systems, well-developed forestry research, as well as law enforcement, failed (Kirchhoff, 2010) (see 2.1).

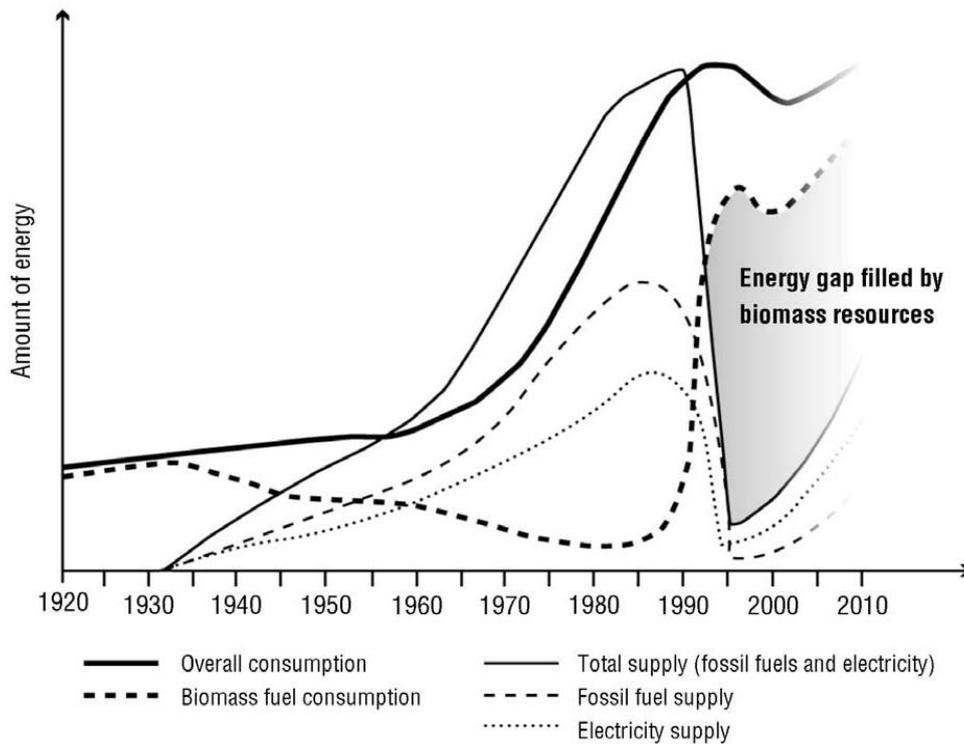


Fig. 6: Schematic model of energy consumption and supply in Gorno Badakhshan. Hoeck, et al. 2007¹⁵

Despite the civil war, in 1992 the government decided on a law about the restructuring of land ownership. However, the Land Code was only applied in 1995. “It ensures that land will remain the property of the state but that a life-long and inheritable lease on land can be granted to private farmers” (Herbers, 2001). Nowadays the economy in Gorno Badakhshan is still oriented towards the agricultural sector. On private agricultural lands, the local production increased dramatically (Breu and Hurni, 2003). With the collapse of the Soviet system practical daily concerns of local people caused traditional knowledge to reassert itself. “[...] the creative and pragmatic interaction between indigenous and scientific knowledge sustains the best hope for survival” (Kassam, 2009). The industrial sector is dominated by the power generating industry. Small hydropower stations are adapting to new economical frameworks (Breu and Hurni, 2003). Markets have been developing and some private enterprises in the agriculture and construction and trade sector appeared in the region. However, a difficult legislative process is the biggest obstacle to open such small enterprises. The state remains the most important employer (Sieber, 2003). Education, health and administration make up the service sector (Breu and Hurni, 2003). There is one state university in Gorno Badakhshan named Khorog State University (KSU). A noticeable event in the education system was the ceremony of launching the University of Central Asia (UCA)¹⁶.

¹⁵“There are no numerical data on supply and demand for this period. The curves are estimations based on demographic data, data of energy production and imports for single years, as well as historical and anecdotal evidences, such as construction of power stations and grids, amount of coal supplied to households and villages, and the harsh conditions during the years of civil war in the 1990s. In the absence of hard data, this figure is illustrative of how energy consumption developed and how supply sources changed over the years” Hoeck, et al., 2007.

¹⁶UCA has been established in 2000 by the Presidents of Tajikistan, the Kyrgyz Republic, Kazakhstan, and His Highness the Aga Khan. The mission of UCA is on the one hand to promote the social and economic development of mountain regions and on the other hand to help the different peoples of Central Asia to preserve their rich cultural traditions and heritages (UCA, 2011).

Most of the investments in human resources as well as in physical infrastructure of the region during Soviet times has been beneficial for the Pamiri people¹⁷. However, the Tajik and Afghan Pamiris who had shared the same area, cultural history and knowledge until the division are now divided by their different ways of use of natural resources. On the Tajik side, ecological indigenous knowledge was devalued by scientific knowledge during the Soviet time, whereas on the Afghan side it has remained a basis for daily needs until today (Kassam, 2009).

Although the crisis has been overcome, Gorno Badakhshan is still dependent on other regions for external inputs. The current economic situation and public services' conditions are not yet stable enough that the Pamiri people can withstand a similar crisis (Sieder, 2003). The transition time in Gorno Badakhshan before, during and after the Soviet Union is summarized in the Table 2.

Table 2: Transition in Gorno Badakhshan (based on different sources).			
	Before the Soviet Union (before 1925)	Soviet period (1925-1991)	Post-Soviet period (1991 till present)
Population	Less than 23,000 in 1917	Reached 150,000 in 1990	Reached 218,000 in 2008
Occupation of the people	Self-sufficient household's scale agriculture and livestock keeping	Employment by the State, industrial scale agriculture and livestock keeping (<i>kolkhozes, sovkhazes</i>)	Employment by the State, private enterprises, agriculture and livestock keeping
Religion (Ismaili muslims)	Religious freedom	Prohibited	Religious freedom
Land use	Only traditional way with plow and bulls	Tractor and other machineries	hardly maintained old machineries and traditional way with plow and bulls
Land ownership	Feudal lord	Only the State	State and privatized for lifelong
Forest management	Community based management	Centralized management system	Old management system and JFM
Forests ownership	Common land	Only the State	Only the State and leased to local people
Industry	No industry	Industrial development e.g. hydropower stations	hardly sustained industrial sector
Industrial ownership	-	Only state	State and private
Public services	No public services	Considerable public services' development e.g. free education and health service	hardly sustained public services
Public services ownership	-	Only state	State and private

¹⁷As a result of education programs literacy in the region is almost universal.

1.3 Forest resources, forestry sector and forest management in Tajikistan

1.3.1 Forest resources of Tajikistan

Forests in Tajikistan belong to the State. However, there is no central governmental database on forest resource and logging activities (Ahmadov, 2008). It is therefore very difficult to obtain reliable data on forest cover, distribution, volumes of stock, species composition and other kinds of data. The current available data go back to the Soviet Union and can serve at best only as a very rough estimate (Kirchhoff, 2010).

Historical records confirm that roughly one hundred years ago, forests covered approximately 25% of the area of today's Tajikistan. After the Soviet power has been established, in order to make more land available for cotton production, large forest areas were cut down, in particular *Tugai* forests (see 1.2.4) (Kirchhoff, 2010). According to Global Forest Resources Assessment (FRA) (2010) forests currently cover little more than 3% of the territory of Tajikistan (410,000 hectares). Other recently conducted field based estimates on the reliability of these data suggest that due to the ongoing human induced degradation process currently even less than 2% of the territory of Tajikistan can be classified as covered by forests (Kirchhoff, 2010).

The most widespread types of forests in the country are:

- Coniferous forests (*juniperus* forests)
- Broadleaved *mesophilous* forests
- Small-leaved *microthermous* mountain forests
- *Xerophilous* light forests (*shibliak*)¹⁸
- *Tugai* forests

Small-leaved forests (also known as riparian forests or floodplain forests) are formed in the floodplains of the river banks in higher elevations from 1,500masl (Akhmadov, 2008; Krchhoff, 2010) to about 3000masl (see Fig. 7). They consist of the following main species: *Salix turanica*, *Salix shugnanica*, *Salix wilhelmsiana*, *Salix alba*, *Populus pyramidalis* and *Populus pamirica* and *Hippophae rhamnoides* (Novikov and Safarov, 2003; Akhmadov, 2005; Akhmadov, 2008; Krchhoff, 2010). These forests are also invaded by different shrubs and other forms of grassland vegetation. Small-leaved forests fulfill very important buffer functions for the discharge balance of rivers and for erosion control along riverbanks. Nowadays small-leaved forests are mostly heavily degraded due to illegal, unregulated cutting mostly for fuel wood, grazing and salinity, which leads to a loss of these important ecological functions (Kirchhoff, 2010).

¹⁸ “*Shibliak* - these are communities of mesoxerophytic and xerophytic mesothermophilous deciduous trees and shrubs, occurring in sparse stands. *Shibliak* stands are well adapted to surviving long dry summers with only a brief period of hibernation” (Ahmadov, 2008).



Fig. 7: Riparian forest in the Tajik Pamirs. Photo: Mislimgshoeva, 2011

The average wood volume of Tajikistan's small-leaved forests is about 60-150m³ per hectare (Novikov and Safarov, 2003). Following the principle of sustainability and given an average annual growth increment of 10m³ per year/ha (for *salix* and *populus* species) the annual harvest should range below these 10m³ per hectare per year (Kirchhoff, 2009).

1.3.2 Forestry sector of Tajikistan

After 1991 natural resources in Tajikistan were managed by many different ministries and agencies. However, the cooperation between these responsible structures was poor and inefficient. In 2008 a new single and high-level state agency, the Committee on Environmental Protection (CEP) was established in order to regulate natural resource management and environmental protection. Tajikistan's forests are managed by the State Department for Forestry and Hunting (SDFH), which is part of the CEP. The SDFH currently consists of basically two departments: one for forest restoration and the other for forest protection. Furthermore, it is the institutional head agency, which currently comprises 42 "Leskhoz"¹⁹, 5 tree nurseries and 13 temporary protected areas in all regions of Tajikistan. A *Leskhoz* comprises 2 functions (Kirchhoff, 2010):

- State Forest Agency (SFA): sovereignty function (e.g. control and regulation of forests)
- State Forest Enterprise (SFE): enterprise function (e.g. supply of timber and non-timber forest products)

¹⁹*Leskhoz* comes from the Russian word for forest enterprise, which combines State Forestry Agencies (SFA) and State Forestry Enterprises (SFE). Under each *Leskhoz* there are several *lesnichestvo* which are subordinates of the *Leskhoz* to implement their enterprise functions (Kirchoff, 2010).

The main tasks of *Leskhoz* are (Kirchhoff, 2010):

- forest protection, reforestation²⁰ and afforestation²¹, management of forests and establishment of tree nurseries
- forest-fire protection measures
- protection of wild animals and hunting
- supervision of the management of *zakazniks*²²

The main legal framework for forest management is the forestry code of the republic of Tajikistan. In 2003 the Government of Tajikistan initiated a complete revision of this code. The new code became effective on August 9th, 2011 (Kirchhoff, 2011). Although with the elaboration of a new forestry code of Tajikistan, a reform of the forestry sector according to the principles of forest protection and development through sustainable use has been initiated, up to now all *Leskhoz*es in the regions receive top down orders from the SDFH for annual harvest and areas to be planted and/or rehabilitated.

1.3.3 Participatory approaches of forest management in Gorno-Badakhshan

Impulses for new approaches to forest management in Gorno Badakhshan

The forest management in Gorno Badakhshan follows the general system in Tajikistan (see 1.3.2). However, there are some positive developments, which make it a progressive example and a basis for a forestry sector reform in Tajikistan gave impulses to the new national forest code (see 1.3.2). The reason for that is that since 2006 in Gorno Badakhshan by the support of the Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, *Leskhoz* started to implement a Joint Forest Management (JFM) approach (see 1.1.1) on a pilot base in one village of the Roshtkala district of Gorno Badakhshan in order to rehabilitate degraded riparian forests. Based on the positive six years' experience on this pilot plot, *Leskhoz* started to disseminate the approach to other districts of Gorno Badakhshan. At present, there are 1841 hectares²³ of *Leskhoz* forests under JFM in Shugnan, Ishkashim and Roshtkala districts and about 420 tenants (Leskhoz, 2011).

Joint Forest Management in Gorno Badakhshan

JFM represents an innovative decentralized management approach for the state owned forests. The main idea of this approach is that protection and rehabilitation of forests are only possible together with local forest users, when they are involved in the management and receive benefit from “their” forests. The approach in Gorno Badakhshan is more focused on individual lease contracts than on collective leasehold agreements (see 1.1.1). This is a consequence of the general reluctance of local people after the Soviet experience to agree on collective management schemes. In Gorno Badakhshan, on the basis of lease contracts, *Leskhoz* gives long-term property rights to local people who depend on these resources and by

²⁰ “The act of planting trees on bare or open land which was covered with forest growth within the last 50 years” (Kirchhoff, 2010).

²¹ “Afforestation the act of converting bare or open land that had been without forest vegetation for at least 50 years into a forest” (Kirchhoff, 2010).

²² “*Zakaznik* is a temporary protected area, located within a *Leskhoz*” (Kirchhoff, 2010).

²³ The total *Leskhoz* area in Shugnan, Ishkashim and Roshtkala districts is 2885ha (Leskhoz, 2011).

that achieve an enhanced protection and rehabilitation of the forest plots. Along with the Land Code, such lease agreements can be concluded for the period of 20 years only. However, under two preconditions the contract can be prolonged for another 20 years: if there are no violations from the tenant side as well as from *Leskhoz* side and if the tenant is willing to continue to sustainably manage the plot²⁴.

Central elements of the JFM approach are:

- ‘Contract on Joint Forest Management’ between local tenant and *Leskhoz*, which in detail defines rights and duties of both parties
- Participatory elaborated ‘Management Plan’, which sets a mid-term frame for an independent management of forest plots by the individual tenant
- ‘Annual plan’ – defines the annual investments and volume of use of forest resources from the individual plot
- ‘Joint Forest Management Council’, which includes all stakeholders on community level to develop common visions and eventually settle disputes
- ‘Technical consultation’ by *Leskhoz* to the tenants

Saving Book Approach: a Payments for Ecosystem Services-like scheme

Based on six years of positive experience with JFM in Gorno Badakhshan²⁵ one can say that the approach is capable to introduce a sustainable forests management on plots where there is still some forest vegetation left and where water supply of the plot is functioning. However, there are many severely degraded areas where no or very few vegetation is left and where there is no stable water supply. A common feature of such plots is the absence of sufficient fencing and planting material. Kirchhoff (2009) classifies such forest areas as ‘marginal sites’ or ‘category III’ sites (see Box 1). Due to the high necessary investment costs, local people cannot be motivated to lease such forest plots under JFM. On the one hand they cannot afford the high rehabilitation costs, on the other hand there is no quick benefit perspective from such plots, e.g. from collecting firewood. As a result, these plots remain deserted and respectively the pressure on neighboring forest plots increases.

Following the Saving Book Approach (SBA) example from Vietnam (see 1.1.1), *Leskhoz* with the support of GIZ launched a pilot project for the reforestation of a deserted 20 hectares *Leskhoz* plot in the village of *Vuzh*, located in the Shugnan district of Gorno Badakhshan (see 4.6). From this pilot project, practical experiences for the adaptation of SBA and a large-scale participatory reforestation program supported by foreign financial donor assistance are intended to be gained.

²⁴This means to protect, rehabilitate and develop on one side and to use resources on the other side.

²⁵The comparative monitoring of leased and unleased plots shows significant improvements of forest cover on leased plots. The income for *Leskhoz* and tenants from leased plots is increasing (*Leskhoz*, 2011).

Box 1: Categorization of forest plots according to their degradation in Gorno Badakhshan (Kirchhoff, 2009).

“Excellent sites (Category I)

These are degraded sites with sufficient vegetation cover of wooden vegetation (70 percent), mainly coppice (salix sp.) but with substantial amount of trees germinated from seeds (populus sp.). Water supply for irrigation is available and the construction of irrigation channels can be done manually. Given adequate protection and management, these forests will regenerate within three years and will generate revenues for the tenant.

Medium sites (Category II)

These are degraded sites with a wooden vegetation cover full of gaps (the wooden vegetation covers less than 50 percent). Existing vegetation consists mainly of coppice (salix sp.) with few trees germinated from seeds (populus sp.) and some shrubs (sallow thorn, rose hip, etc.). Water supply for irrigation is available, but the construction of irrigation channels needs major inputs. Under adequate protection and management, these forests will regenerate within four to seven years and have good potential to generate revenues for the tenant.

Marginal sites (Category III)

These are heavily degraded sites, hardly with a wooden vegetation full of gaps (less than 20% of the site is covered by wooden vegetation), mainly coppice (salix sp.). Natural regeneration is scarce, so that enrichment planting and reforestation is needed as an urgent investment. Water supply for irrigation is not available, and the construction of water supply needs major inputs. This type of forests needs substantial investments, particularly in terms of protection, planting and irrigation. Under adequate protection and management, these resources will regenerate within eight to ten years before tenants and *Leskhoz* can expect revenues²⁷.

In *Vuzh* as an incentive, the tenants who lease a deserted *Leskhoz* plot get a deposit account with a total amount of 500EUR per hectare, to be withdrawn over a time period of six years (see Fig. 8). Each year, a clear goal for achieving reforestation is formulated²⁶, which is a strict precondition for the withdrawal of the annual share and interest. Fencing and planting material is provided by *Leskhoz*. Table 3 illustrates a possible distribution of the income shares and interests for a plot of 1 hectare. If the holder of the deposit account complies with the agreed yearly rehabilitation procedures, he/she gets access to a share of the deposit (according to the required work input in the respective year) plus interest earnings. The withdrawal occurs every year at the end of the planting season. Because of the high labour input for the preparation and implementation of the planting, the withdraws from the deposit account do not fully compensate the plot tenants in the first years, whereas in the subsequent years the labour input is limited and annual shares can still be withdrawn. Additionally, 4-5 years after planting, the first forest products can be harvested for own consumption or for sale, in accordance with *Leskhoz*²⁷ (*Leskhoz*, 2011).

Table 3: Yearly rights to withdraw shares and interest from the saving book (*Leskhoz*, 2011).

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Total
Sum at beginning of year (€)	500	400	275	150	75	25	
Annual share (%)	20%	25%	25%	15%	10%	5%	
Annual share (€)	100	125	125	75	50	25	500
Interest (12% per year, in €)	15*	48	33	18	9	3	126
Annual share + interest (€)	115	173	158	93	59	28	626
* As in the first year the money will be paid after 3 months, the interests for this period are lower than for the following years							

SBA is PES-like initiative (see 1.1.1 and 1.1.3) by *Leskhoz* supported by GIZ to enhance ES in Gorno Badakhshan. However, the situation in Gorno Badakhshan differs from the classical type of a PES

²⁶Examples for the annual goals are digging irrigation channels, preparation of plantation site, planting, survival rate of planting material, maintenance of the site etc.

²⁷Under the terms of the lease contract, a certain percentage of the harvest will be paid to the Forestry Agency for each forest product.

scheme described by Engel et al. (2008) (see Fig. 2). In the case of SBA in Gorno Badakhshan the ‘buyer’ and the ‘seller’ both are at the same time users of the ES. Moreover, PES schemes are mostly focused on conservation of existing ES, whereas SBA means payment for the reestablishing of ES of forests. Once the forest plot is rehabilitated and newly delivers its services after six years of SBA, no further PES will be necessary, since the marketing of forest products will even exceed the payment (see Fig. 8). *Leskhoz*, the official owner and manager of the forests is in a position to decide how the payment should be design in a certain village. On the other hand, local people in the village can decide whether they are willing to enroll in the approach, after being informed about the terms and conditions.

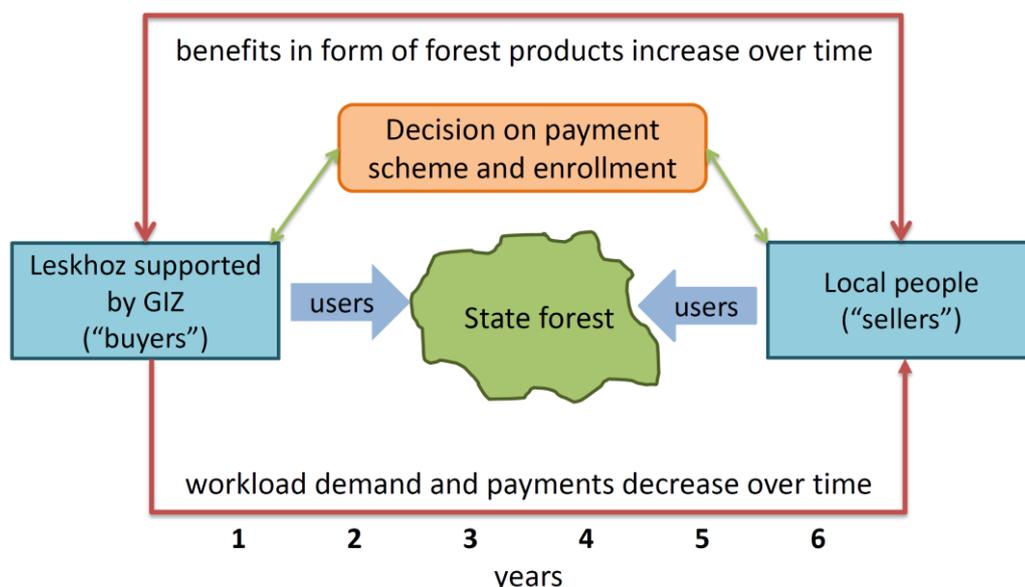


Fig. 8: The payment scheme of Saving Book Approach.

The reforested areas under JFM and SBA are supposed to serve as firewood plantations for the local people and *Leskhoz*. These plantations would:

- bring fast economic benefit for *Leskhoz* and local tenants in the form of marketable NTFP, such as firewood, dog rose
- replace the currently unsustainably and illegally cut firewood by sustainably produced firewood

These two points will potentially lead to a decrease of pressure on the remaining natural forest areas, while JFM and SBA would change the traditional understanding of receiving grants for forests rehabilitation without responsibility, replacing it with the idea of involvement of local people into forests management and responsibility in a long terms sense.

2 Considered problem, research objective and hypothesis

2.1 Causes and problems of forest management in Gorno Badakhshan

The total area of forests of *Leskhoz* in Gorno Badakhshan is around 78,490 hectares. Out of this, only 10,130 hectares (13%) are covered by forests (Leskhoz, 2010). Yet, even these small areas of forests are threatened by human activities. The main reasons for the current forest degradation can be summarized as follows (Kirchhoff, 2009; Kirchhoff 2010; personal communication):

- The energy crisis which continues until today in Gorno Badakhshan is characterized by a huge gap between supply and demand of energy especially during winter time. As especially in rural areas there is almost no other source of energy, the local population and state institutions have to use fuel wood for heating and cooking (see Fig. 9). This leads to massive cuttings of the few existing forests. Inefficient heating and cooking devices and poorly insulated houses increase the degree of the problem.
- Since the beginning of the 21st century a lack of appropriate pasture land can be observed. This is due to increased number of livestock²⁸. As a consequence people are forced to use forests as pasture especially in spring time when there is a lack of fodder. The intensive grazing during spring time leads to a destruction of juvenile growth (see Fig. 10).
- Until recently only a non-adequate for the current political and socio-economic situation legal framework existed, which was still lasting from Soviet times (see 1.3.2). Local people were not allowed to participate in the local management of the resource. All forests belong to the State but effectively with the breakdown of the Soviet system the forests as common resources (see 1.1.1) faced an open access scenario. Respectively no one was stimulated to protect, rehabilitate, develop and sustainably use the forests. On the opposite most of the cuttings were conducted illegally and even worse unregulated. Due to the lack of a benefit perspective rehabilitation and development measures practically had stopped.
- At the same time the collapse of the Soviet, *Leskhoz* system led to a very weak control by the state. Sometimes *Leskhoz* staff even initiated the illegal and ruthless cuttings. *Leskhoz* suffers from a lack of properly trained staff. Young and potential staff is not motivated to start a career in the forestry because of very low salaries and the inflexible structures. *Leskhoz*es are still organized in a very centralized way. They completely depend on the small budget they get from the SDFH on the national level (see 1.3.2). At the same time *Leskhoz*es have to stick to unrealistic annual work plans based on out-dated information, provided by the SDFH. During the Soviet period powerful research institutes were active in professional training of forestry staff and forestry research. This abruptly stopped with the independence of the Soviet Union. Today there are almost no applicable knowledge

²⁸Governmental statistics report rises of about 20 to 30 percent in for sheep and goats as well as for cows since the end of the 1990s. Until then the number of livestock was declining (MSDSP, 2007), because local people pay more attention to the quantity of livestock than to its quality.

and experiences available in the region, on how to protect, rehabilitate and manage forest with involvement of local people especially deserted plots, using participatory approaches which guarantee economic and ecological sustainability.

- Lack of machinery for maintaining the irrigation system leads to collapse of the channels and ditches in the forest plots. Thus no water reaches the plot. In the Soviet time all channels and ditches were maintained annually.
- The forestry sector suffers from an absence of appropriate databases, an inadequate monitoring system and outdated maps and figures. *Leskhoz* GBAO still relies on data and maps from the mid of the 1980's for its planning activities.



Fig. 9: Illegal cuttings in Roshtkala district, Gorno Badakhshan. Photo: Mislimeshoeva, 2007



Fig. 10: Uncontrolled grazing on a forest plot in the Ishkashim district. Photo: Mislimeshoeva, 2008

Historical photographs give interesting insides in the degree of forest degradation following the independence of Tajikistan. Fig. 11 shows the forest plot of Abkharv in 1967 and 2011 in Ishkashim district. In the 1970's reforestation campaigns began in this district. From 1970 to 2011 the planted forests had the potential to be covered by trees with a height of ca. 10m. However, when looking at the 2011 image of Fig. 11, no difference in tree height can be seen compared to 1967. This indicates that trees and shrubs have had little ability to grow, due to forest degradation caused by significant and constant human and livestock pressure.



Fig. 11: Abkharv plot in 1967 and 2011, Ishkashim district. Photos: Kosumbekov, 1967 and Nurmamadov, 2011

Today, many of the forest plots completely disappeared or are literally struggling with desertification. Often moving sands overlay the remaining trees as well as human infrastructure and settlements (see Fig. 12). In Gorno Badakhshan forest degradation seem to be aggravated by local effects of the global climate change (see Box 2).

Box 2: Climate change and forests in Gorno Badakhshan (Ibele et al., 2011).

Riparian forests in Gorno Badakhshan are formed in the floodplains and along the small rivers coming from the gorges (alluvial fans of small tributaries to the main rivers). Therefore these forests depend on the water availability in the mountains (see 1.3.1).

“As such tributaries fed by smaller glaciers are about to disappear or at least drastically decline in medium-term perspective alluvial forests will suffer from water scarcity, too. Floods, mudflows and glacial lake outburst floods on the other hand can imply significant losses of forests and riverine erosion is a constant threat to alluvial forests. Indirect impacts of climate change on forests are expected by the increasing pressure on agriculture (among others: reduced harvests) and on cattle breeding (less fodder production especially on winter pastures). This could lead a steady deforestation in gain for arable land and invasion of cattle. But also uncontrolled wood extraction for heating, cooking and house construction reduces the natural resilience of the ecosystem “forest”. Climate impacts like drought, cold spells, heavy winds, insect invasions and pests thus may have more devastating consequences. In consequence, these negative impacts of climate change on alluvial and flood plain forests will harm the multiple ecological functions and the sustainable use of the forests as supplier of timber and non-timber products”.

In the context of the current study, riparian forest degradation in Gorno Badakhshan is defined as a human-induced phenomenon, caused by uncontrolled cutting and livestock grazing according to a weak state controlled management system not considering the needs of local people and resulting in a reduction of forest vegetation cover and destruction of water supply on the plot. Negative consequences of degradation are the loss of some or all ES of the forests (see 1.1.2).



Fig. 12: Moving dunes from a deserted former forest plot threatening neighboring forest. Some of the trees in the foreground are already covered by a 3m layer of sand. Photo: Mislimshoeva, 2011

Empirical studies show that since the independence of Tajikistan (see 1.2.3) the ES of riparian forests in Gorno Badakhshan declined dramatically. Schumacher (2010) has conducted comparative analysis on:

- ES or values of forests which the population benefitted or still benefits from
- ES or values that are disturbed (the values that still provides the population with food and raw materials but the use of them is not sustainable)
- ES or values which were not used in the Soviet Union and at present (see Table 4).

Table 4: The provision and use of ecosystem services in Gorno Badakhshan in comparison over time (Schumacher, 2010).

(Δ benefit \times disturbed \ast no demand)

Values	Soviet Union	Today
Direct Use Values		
<i>Timber</i>	*	\times/Δ
<i>Fuel wood</i>	*	\times/Δ
<i>Non-timber forest products</i>	Δ	\times/Δ
<i>Recreation/Tourism</i>	Δ	\times
<i>Research/Education</i>	Δ	Δ
<i>Cultural/Religious</i>	Δ	\times
Indirect Use Values		
<i>Soil conservation</i>	Δ	\times
<i>Water supply</i>	Δ	\times
<i>Water quality</i>	Δ	\times
<i>Flood/Storm protection</i>	Δ	\times
<i>Climate regulation</i>	Δ	\times
<i>Carbon storage</i>	Δ	\times
<i>Carbon fixing</i>	Δ	\times
<i>Biodiversity</i>	Δ	\times
<i>Amenity</i>	Δ	\times

2.2 Purpose and conceptual framework of the work

The present forest degradation and deforestation in Gorno Badakhshan is mainly driven by factors, such as energy crisis, shortage of pasture area, unclear legal framework and weak control by the state, gap of scientific knowledge and lack of reliable databases on forestry (see 2.1). These key problems are important, however, the main constraint nowadays is the weak forestry management system not involving the local people. For developing and strengthening a new and adapted to the local conditions forestry management system state and international organizations such as Nature Protection (NP), Mountain Society Development and Support Programme (MSDSP), United Nations (UN) and Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH in corporation with Leskhoz have been and currently are implementing different projects.

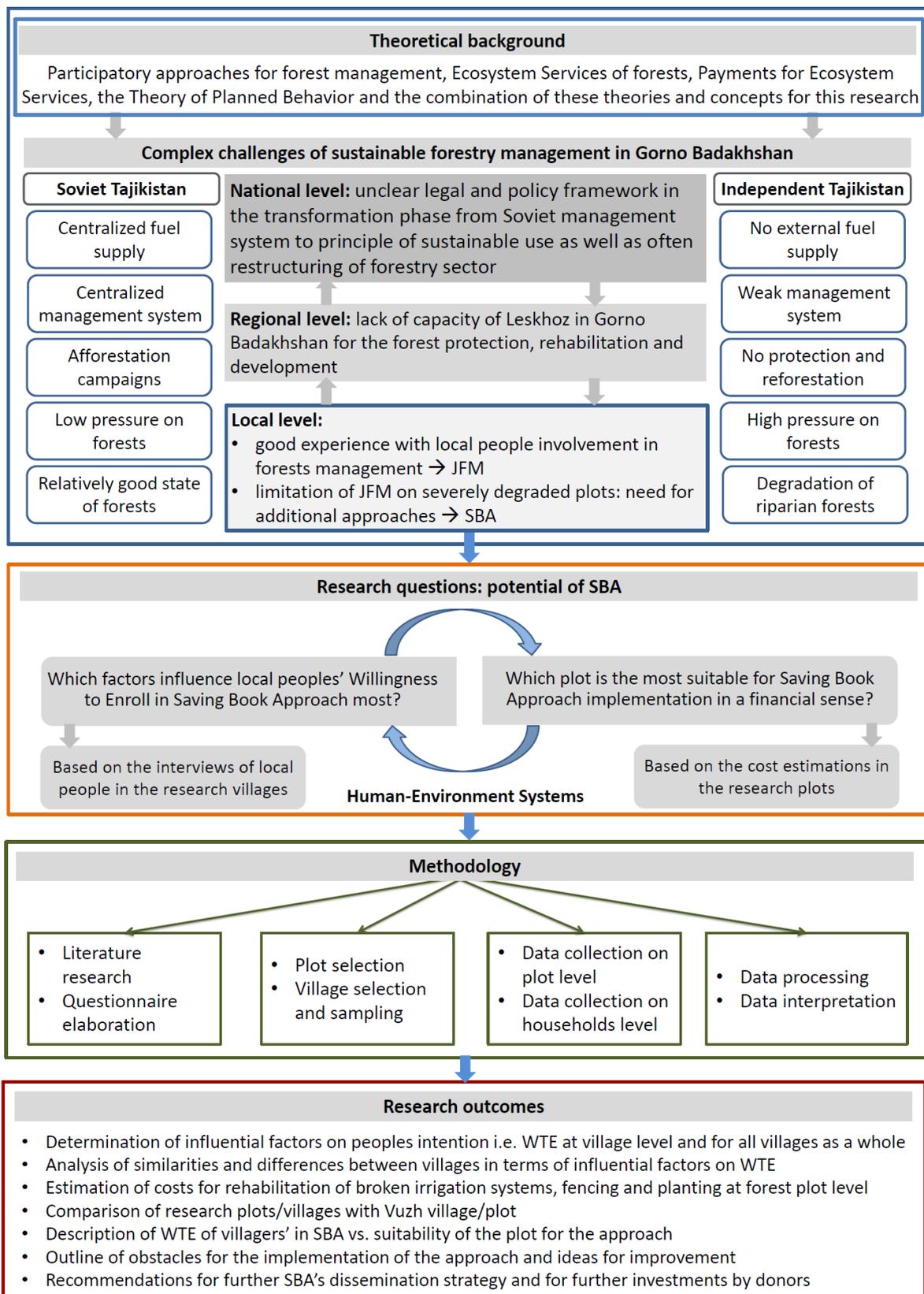
By the joint work of *Leskhoz* and GIZ, Joint Forest Management (JFM) and Saving Book Approach (SBA) have been implemented in Gorno Badakhshan since 2006 and 2011, respectively (see 1.3.3). SBA as part of JFM has been implemented in one pilot plot in *Vuzh* (see 1.1.1). For further dissemination of SBA an analysis of factors which influence the decision of local people to enroll or not to enroll in SBA is necessary. At the same time, conditions of forests plots need to be analyzed.

There is a growing number of studies on analyzing factors influencing peoples' WTE in a certain reforestation program, conservation, land management and decision making (Carr and Tait, 1990; Lynne et al., 1995; Beedell and Rehman, 1999; Beedell and Rehman, 2000; Pouta and Rekola, 2001; Fielding et al., 2005; Edwards, 2006; Kilgore et al., 2008; Koellner et al., 2010; Liu et al., 2010) in other parts of the world. However, no such studies have been carried out in Central Asia and in Tajikistan in particular to date. This thesis contributes to the improvement of understanding of factors, which influence local peoples' decision to enroll in SBA. The successful adaptation and implementation of not only SBA, but

also any participatory approach depends on how well the ‘reality on the ground’ is analyzed and understood.

The purpose of this research is to determine the factors influencing local people’s Willingness to Enroll in SBA on the village level and to identify a suitable forest plot in terms of needed investment for the reforestation under SBA. For this, three villages/plots were chosen in Gorno Badakhshan where this study was conducted. All results only refer to the studied villages. It is not the intention of this thesis to make generalized conclusions for whole Gorno Badakhshan. However, based on the results of this study the developed criteria (see 6.2) can be applied to select plots and villages for SBA implementation beyond the studied villages.

Fig. 13 depicts the conceptual framework of the current thesis. It shows the connection between the used theories and concepts, background of the investigated problem the main research questions, the chosen methodology as well as the results (outcomes) and discussion of the study.



- Legend:**
- Chapter 1: Introduction
 - Chapter 2: Considered problem, research objective and hypotheses
 - Chapter 3: Methods and case study area
 - Chapters 4, 5 and 6: Results, Discussion and Conclusion

Fig. 13: Conceptual framework of the study.

2.3 Research questions and hypothesis

For a further successful dissemination of SBA to other villages in Gorno Badakhshan, two preconditions are needed to be taken into account:

- the willingness of local people to enroll in the approach and
- the suitability of the plot in terms of investment needs.

These two basic requirements need to be analyzed before the implementation of SBA in order to find out if both of them are met. In the current research, these two preconditions of a successful implementation of SBA are analyzed in three villages of Gorno Badakhshan.

The determination the influential factors on the willingness to enroll (WTE) is measured based on statistical analysis and focuses on the following research question:

Which factors on the village level influence local people's Willingness to Enroll in Saving Book Approach most?

The underlying hypothesis of the research is:

Null: On the village level, there is no difference between local people, who are Willing to Enroll and who don't in Saving Book Approach with regards to their benefits expectations, 'social pressure', 'ability', 'age' or 'income'.

Alternate: On the village level, local people who are willing to enroll in Saving Book Approach differ significantly from those who don't with regards to their 'benefits expectations', 'social pressure', 'ability', 'age' or 'income'.

The investment cost estimations for the individual plots are based on needed financial means for labor, material, and transportation, which are necessary for a rehabilitation of broken irrigation systems, fencing of the plot and planting of trees on the plot. Here the following research question will be answered:

Which severely degraded forest plot has the best ratio of rehabilitation costs concerning water supply, fencing and planting?

For triangulating and validating the results of the three plots and villages it is considered to analyze the lessons learned so far from the *Vuzh* plot/village, where at present first SBA measures are in implementation (see 4.6).

3 Methods and case study area

3.1 Methodological concept

To find adequate answers to the research questions of this thesis (see Fig. 13) a multidisciplinary²⁹ set of methods was developed. These methods were applied according to logical steps to distinct purposes (see Fig. 14).

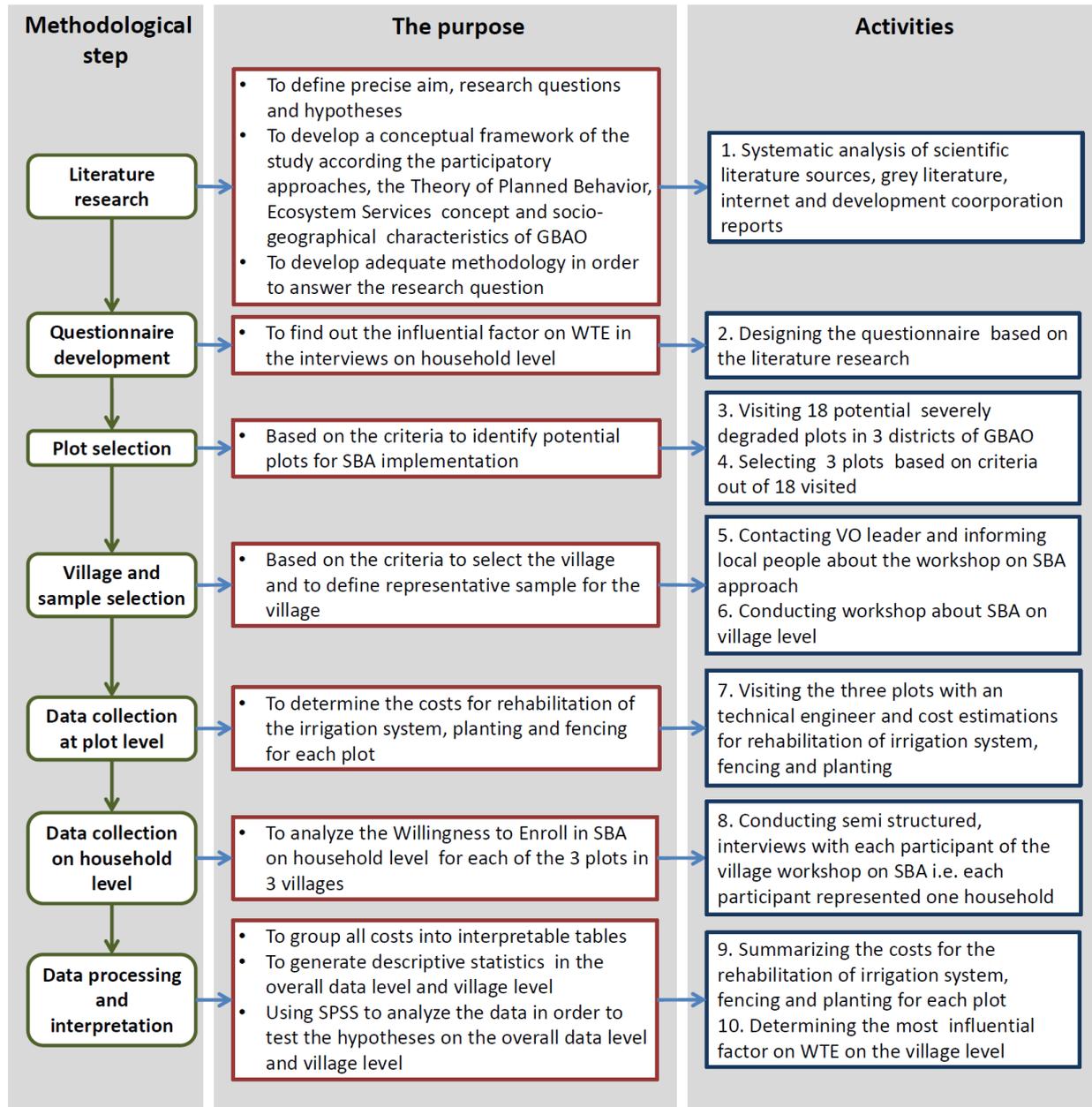


Fig. 14: Overview on methodological steps, their purposes and respective activities in the framework of the study.

²⁹In the current study methods of empirical social research for the survey on Willingness to Enroll, geo-ecological methods for the site selection and description as well landscape engineering methods for the calculation of plot reforestation costs were applied.

3.2 Questionnaire elaboration

The central part of the questionnaire (see Appendix 1) was based on the TPB (see 1.1.4). It is necessary to mention that in this study only the intention i.e. Willingness to Enroll SBA of interviewed people was analyzed and not the behavior. For an analysis of the actual behavior, the implementation of SBA would be a precondition³⁰. According to the TPB the underlying model of the questionnaire focused on three main components (see Fig. 15):

- a) ‘Benefit expectations’: they encompass the perceived importance of benefits i.e. of ES to the interviewee; and to which extent the interviewee expects to gain the benefits in the time frame of SBA. Examples are the questions: ‘How important is fuel wood to you?’ (oei) and ‘Do you believe that you could harvest fuel wood in this particular plot in six years of SBA?’ (bsi) (see equation 1).

Based on the broad classification of ES by MA (2005) (see 1.1.2) several forest services were evaluated and labeled as ‘benefit expectations’ (see Table 5). These services were chosen according to:

- their importance to local people (based on the pre/testing of the questionnaire)
- their direct use by local people
- the fact that these services could potentially materialize in the time frame of SBA (see 1.3.3)
- that they were relatively easy to be evaluated by local people on a scale from 1 to 5³¹.

Table 5: Ecosystem Services in the context of this study.

Ecosystem Service	Definition in the context of this research	
Provisioning services ³²	Food	Non-timber forest products (NTFP) which can be used for food processing. Namely, it refers to Sea-buckthorn (<i>Hippophae rhamnoides</i>), Barberries (<i>Berberis vulgaris</i>), Wild rose (<i>Rosa canina</i>) and other berries that are growing in the forest and can be used as food. The time needed for growing shrubs and trees is hard to comparable. Therefore, for an easier understanding and measuring it was summarized as “Food” service. Fruit trees were excluded.
	Fuel	Fuel wood includes all types of woody vegetation i.e. trees, and shrubs that local people collect from the forest as sources of energy.
	Fodder	Fodder includes mainly fresh sticks and leafs of tress as well as hay which people grow in-between the lines of tress on the forest plot.
Regulating services	Water regulation	This means the timing and magnitude of runoff, flooding, drought and other related events which can be strongly influenced by changes in land cover such as conversion of degraded area to forest.
	Erosion control	The role of forests for the prevention of landslides and washing away the river bank’s soil, which is a common threat in riparian forests.
Cultural services	Aesthetic values	The beauty of forests for people in the village. This service contributes to the mental well being of people.
	Recreation	Recreation in the forest.

³⁰WTE to enroll in SBA is an intention, while signing a contract of enrollment when SBA is implemented would be a behavior.

³¹For example the importance of fuel wood in a scale from 1-very unimportant and 5-very important.

³²Constraction timber was not included as ES, because in the timeframe of SBA not timber could be harvested. Moreover, the tree species which are growing in the forests are not commonly used for construction.

- b) ‘Social pressure’: it describes how important SBA’s implementation is to other groups of people, explicitly family members, neighbors, *Leskhoz* supported by GIZ and the Village Organization³³ (VO); and to which extent the interviewee cared about the opinion of these groups to get or not to get enrolled in SBA. For example, the questions ‘How important is the reforestation process under SBA to your neighbors?’ (mcj) and ‘How much do you care about the opinion of your neighbor concerning your enrollment in the approach?’(nbj) (see equation 1).
- c) ‘Ability’: it summarizes if the interviewee as well as his/her family members believe that he/she had the time availability, physical ability and availability of labor force to fulfill the workload under SBA and to which extent these determinants were important to him/her. An example of questions is: ‘How much are you restricted by the availability of labor force?’ (pbk) and ‘Is Availability of labor force important to you regarding enrollment in SBA?’(cbk) (see equation 1).

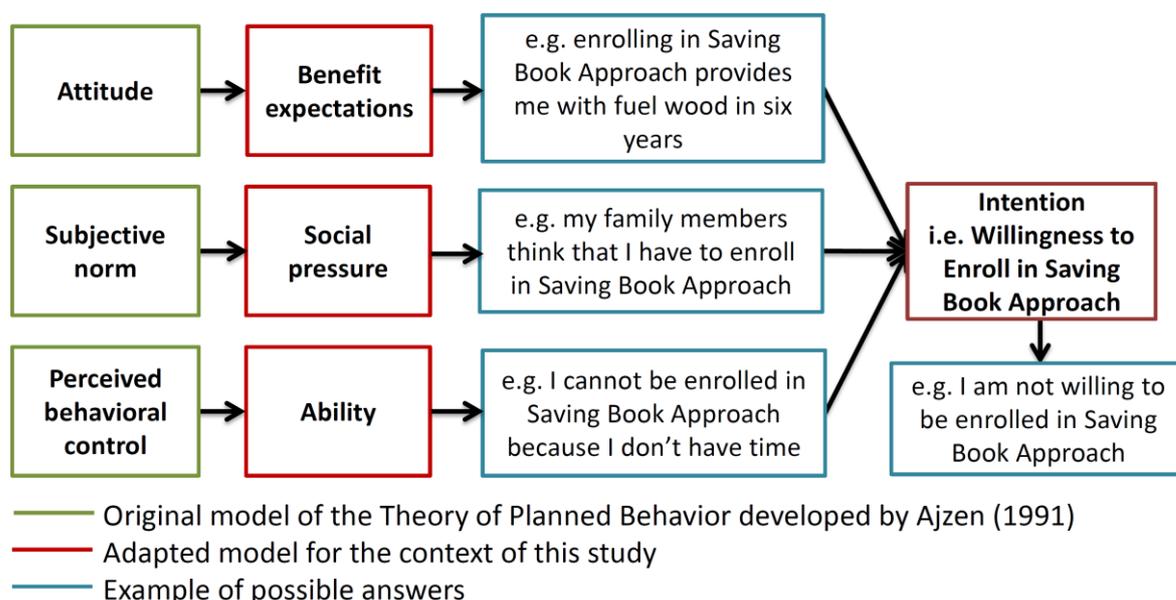


Fig. 15: The Theory of Planned Behavior model of this study.

A Likert scale³⁴ from 1 to 5 was used to evaluate all the variables for each of the components. Based on the literature, when applying the TPB, two measures of each belief were taken:

- One measure relates to how good or bad the effect of the behavior is (outcome evaluation). For example, a tenant may think that planting trees in the forests for getting fuel wood is “good”
- The other measure relates to the likelihood of the behavior leading to this outcome (belief strength). For example a tenant may not think that this effect of his trees planting is very likely. In other words in 6 years it is very likely/unlikely that the tree will provide fuel wood (adapted example from Beedell and Rehman, 1999).

³³“Village Organization (VO), already established in virtually all villages in the Tajik Pamirs, consists of different departments (education, health, agriculture, finance, youth, women, etc.) with democratically elected representatives and a VO president as the head of the village”. VOs were established by MSDSP (Droux and Hoeck, 2005).

³⁴ The Likert scale indicates to which extent each interviewee reflects a positive or negative reaction towards the object of a certain statement or question (e.g. in 6 years of SBA this XY plot is expected to provide several benefits. How likely is it in your opinion for NTFP, fuel wood, fodder for livestock etc. on the scale from 1-very unlikely to 5- very likely).

These two measures were combined multiplicatively and the sum of all the belief compounds produced a belief based on the following equation (Beedell and Rehman, 1999):

$$\begin{aligned} Aact &\propto \sum oe_i \cdot bs_i \\ SN &\propto \sum mc_j \cdot nb_j \\ PBC &\propto \sum pb_k \cdot cb_k \end{aligned} \quad (1)$$

“Where *Aact*, attitude towards a behavior; *oe*, evaluation of outcome ‘*i*’ of performing behavior *B*; *bs*, likelihood that the behavior *B* will lead to outcome ‘*i*’; *SN*, Subjective Norm; *mc*, motivation to comply with referent ‘*j*’; *nb*, likelihood that referent ‘*j*’ would approve of the behavior *B*; *PBC*, Perceived Behavioral Control; *pb*, perceived power of control belief ‘*k*’ to facilitate or inhibit behavior *B*; *cb*, likelihood that control belief ‘*k*’ will facilitate or inhibit behavior; α directly proportional to” (Beedell and Rehman, 1999).

In addition to the main components, the questionnaire included demographic and socio-economic questions such as gender, education, occupation, income and others. Most of the questions were quantitative. However, they were combined with a set of qualitative questions (see Appendix 1). The combination of quantitative and qualitative questions enabled to get a better insight in people’s intentions, e.g. if local people were generally concerned about deforestation near their village or not? A few qualitative questions especially in the very beginning of the interview provided a pleasant atmosphere for the rest of the interview. The quantitative questions were categorized and coded in advance while the qualitative ones were categorized and coded once the data were collected.

A slightly different questionnaire was developed for interviews in *Vuzh* village because there activities had already been implemented and interviewees were already enrolled in SBA (see 1.1.1), which made parts of the questionnaire irrelevant. Here other questions concerning the method for plot division among the tenants, main problems during SBA implementation, work organization or payment were asked.

3.3 Plot, village and sample selection

3.3.1 Plot and village selection

The sampling process in the framework of this thesis was dual. It included severely degraded forest plots, i.e. where the SBA might be implemented (see 1.3) and at the same time a village closest to this plot, i.e. where potential tenants under JFM/SBA come from.

By *Leskhoz* project 18 potential plots/villages were proposed to be visited in April 2011. These 18 plots and respective villages were selected based on the already developed GIS database³⁵. These plots were chosen due to having a relatively big size of a severely degraded area. The slope and other aspects of all plots needed to be checked on the ground. Eight potential areas are located in Shugnan district, 7 in

³⁵The GIS on Forest Resources in Gorno-Badakhshan had been set up on behalf of GIZ by Planquadrat Geoinformation in in 2009 and 2010.

Ishkashim district and 3 in Vanj district. For the selection of plots and respective villages, the following criteria were applied:

- the plot was located on territory managed by *Leskhoz*, but the existence of JFM at these JFM territories was not a precondition (see 1.3.3)
- the plot had been covered by forest before the independence of Tajikistan in 1991(1.2.4 and 1.3.3)
- the plot was located in a certain distance to the pilot plot in *Vuzh* so that the measures there did not influence WTE of people from the other villages
- no investments had been made on these plots after the independence of Tajikistan
- there were no sand dunes in the plot or in the neighboring plots
- the village was the closest one to the selected plot³⁶
- there was not any kind of conflict between local people within the village with regards to forestry or other land use types and management
- the number of household in the adjacent villages should not exceed 50, since otherwise it would not be possible to cover these villages during the short time frame of this research

All 18 potential plots and respective villages were visited together with *Leskhoz* and GIZ representatives. After the field visit, 3 plots/villages were selected based on the joint decision of all stakeholders (see Fig. 16):

- *Shendod* plot/*Chilizat* village, Ishkashim District
- *Varkhedz* plot/*Imam* village, Shugnan district
- *Sadvadg* plot/*Sadvadg* village, Vanj district

Apart from this, the pilot plot/village *Vuzh* was selected, although it is not directly comparable to the three above mentioned plots/villages because of the preceding SBA implementation activities. Accordingly, the data collection, data processing and results have been separated from the ones of the other three villages.

Vuzh was selected for SBA in 2010 due to its ideal conditions for pilot implementation (see 1.3.3): a) it is a completely deserted plot, with a partly destroyed irrigation system on *Leskhoz* land, which has been under forest vegetation formerly b) has an adequate size of 20 ha, which is enough to lessons learnt on the final design of SBA conditions in Gorno Badakhshan, and for which funding could be mobilized through GIZ) c) it is 1km away from the village, so that local people can easily reach it d) there are enough interested people to lease from *Leskhoz* and sufficient labor force is available.

³⁶It is *Leskhoz*' decision from which village the potential tenants would come from. Usually it is the village closest to the plot.

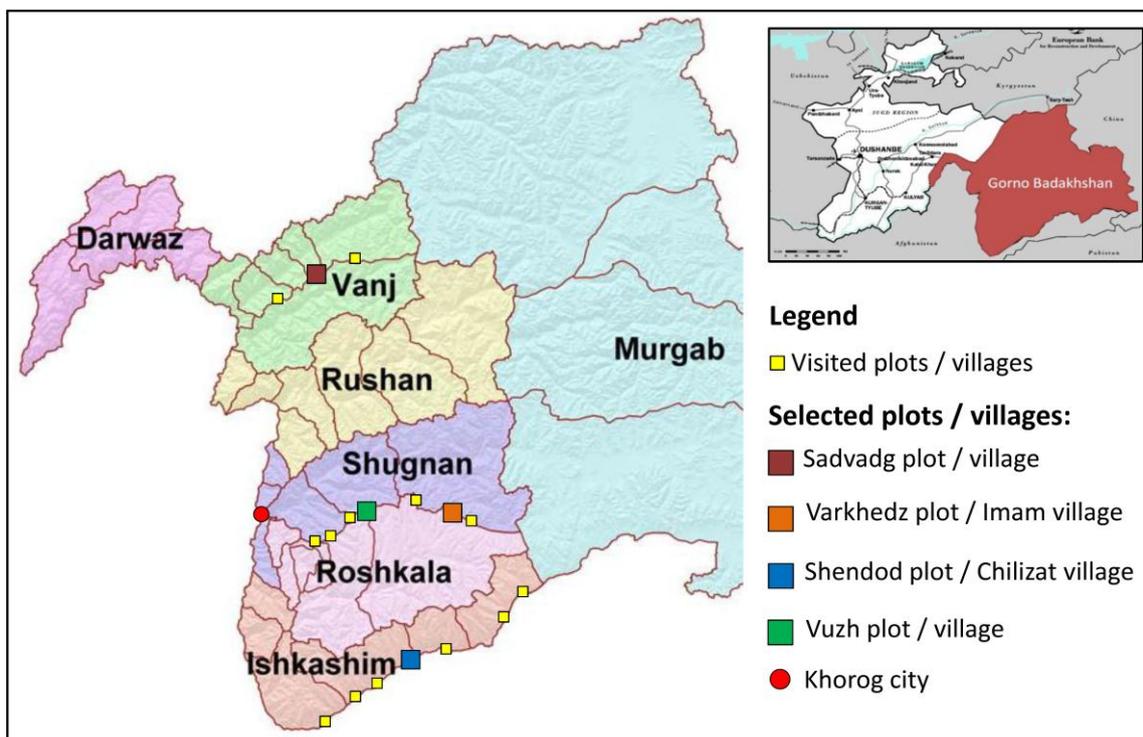


Fig. 16: Villages and plots where the research was conducted. The map of Tajikistan is adapted from Worldmapfinder, 2011. The map of Gorno Badakhshan is adapted from Hergarten, 2004.

3.3.2 Sample selection

Once the plots and villages had been selected, the head of the Village Organization (VO) of each village was contacted and with his³⁷ help local people were gathered for participating in an information workshop held by the representatives of *Leskhoz* and GIZ as well as the author of the current study. The aim of the workshop was to inform local people about all aspects of JFM and SBA approaches (see 1.3.3). The workshop was conducted in a neutral way, preventing influencing people’s decision about their potential willingness to enroll or not to enroll. The workshop’s content was intentionally kept hypothetical, since no implementation activities from *Leskhoz* GIZ could be promised. However all participants were requested to reflect if they were willing to enroll in SBA or not provided that the approach would be implemented on the plot close to their village. The sample included all participants of the information workshop in each village. Each participant represented one household and the sample cover is represented in Table 6:

Village	Total number of households in the village	Total number of surveyed households	% of the interviewed households out of the total number of households
Chilizat	19	13	68
Imam	42	19	45
Sadvadg	23	18	78

In the *Vuzh* village, the target group for the interviews were all the 15 tenants, who were already enrolled in SBA. Therefore, no sampling process was necessary in this village.

³⁷All VO leaders were male.

3.4 Data collection

3.4.1 Cost estimations for plot rehabilitation

The cost estimations were conducted from May to June 2011. For each plot the costs for the rehabilitation of the irrigation system, fencing and planting material provision costs were estimated. The aim of these estimations was to find out how much financial resources would have to be mobilized, if SBA would be implemented there in the future. This estimation was based on the two technical engineers' knowledge who are working for *Leskhoz*. Jointly with the GIZ GIS specialist, digitized maps were elaborated for each plot, which included a scheme of the proposed irrigation system, and fences (see 4.3.2, 4.4.2 and 4.5.2). On the *Vuzh* plot the costs had already been estimated in 2010 because of the ahead of the implementation activities in 2011 (see 1.1.1).

3.4.2 Survey in the villages

During the survey, semi-structured interviews were conducted during May and June 2011. Before conducting the actual interviews, the questionnaire was pre-tested with four individuals from one of the villages of Porshinev *jamoat*³⁸ who were not familiar with the topic at all. This helped to evaluate if the questionnaire was relevant for the fieldwork and if any important question was missing or if some question had to be changed or eliminated.

All interviews were conducted based on the questionnaire face-to-face with the individual interviewee. A precondition to become an interviewee was the participation in the information workshop. The interviews were conducted not directly after the information workshop, but two to ten days after. The idea was to give the participants the possibility to think about their WTE as well as to discuss the issue with their family members³⁹.

During the interviews different kinds of visualization such as a map, a chart and cards with a symbolized Likert scale translated into Tajik language were used. Based on these cards each interviewee was asked a certain question and could choose the answer with showing a card that he/she thought would represent his/her opinion. This approach ensured to keep all interviews comparable and standardized. The map showed the degraded plot which could be under SBA. The chart explained SBA (see Appendix 2). The average duration of one interview was 40min.

3.5 Data processing and interpretation

3.5.1 Cost estimations data

The gathered data concerning cost estimations for the reforestation of the plots under SBA were divided for each of the three plots into the following blocks (see 3.7, 4.3.2, 4.4.2 and 4.5.2):

³⁸*Jamoat* is a Tajik term for communal administration and it consists of several villages.

³⁹Not always the head of the family participated in the workshop.

- Fencing - including the fencing of the plot as a whole
- Channel rehabilitation - including all necessary steps for providing a sufficient and reliable water supply system
- Planting - including horizontal and vertical planting of tree saplings

The costs of each of these activities were categorized and summed up as follow:

- labor costs: including collection of fencing material, assembling and installing of fences; digging of channel by hand, preparation of channel bed; cutting and preparing of saplings by hand, loading and unloading of planting material;
- material costs: including wire for assembling the fence; diversion weir, cement, tubes for channel rehabilitation;
- transportation costs: including truck rental for all kind of transportation, fuel and salaries for drivers;

On the *Vuzh* plot, after the main measures, such as channel rehabilitation, fencing and tree planting were implemented, the previously planned costs of SBA implementation were compared to the real costs. The aim of this comparison was to determine if the planned costs overbalance the actual cost during SBA implementation. This enabled to draw conclusions on the accuracy of the cost estimation method.

3.5.2 Survey data

The household interview data of the survey was analyzed using the Statistical Package for the Social Sciences (SPSS 17) software. The data analysis was conducted for two levels:

- overall data level which included all villages as a whole (N=50)
- individual village level which included data on each village separately (N=19; N=18 and N=13).

Specific statistical tests were used for analyzing the overall and individual village data. The use of a certain test for a certain level of the data is mentioned in each description of the following tests:

Binary Logistic Regression

This regression is widely used in science to analyze the relationships between a dependent variable (binary) and independent ones (Field, 2009; Koellner et al., 2010; Zhang et al., 2011). This regression was used in order to explain the relationships between one dependent variable i.e. WTE on a binary scale ('yes=0'; 'no=1') and independent variables or predictors, such as 'benefit expectations', 'social pressure', and 'ability' for the overall data (N=50) based on the TPB (see Fig. 15). The logistic regression is applied only on the overall data level (N=50) for the TPB model, since on the village level the insufficient number of cases does not allow to apply the model. The stepwise Forward LR method was chosen in order to exclude the insignificant predictors or variables (Field, 2009).

Two independent sample tests

The Mann-Whitney U and Wilcoxon rank-sum⁴⁰ non-parametric tests are commonly used to test the differences between the medians of comparable groups (Carr and Tait, 1990; Field, 2009; Govender et al., 2008; Margianti and Kowanda, 2008; Zubair and Garforth 2006). Two different dependent group were identified, those willing to enroll in SBA, the ‘willing’ and those not willing, the ‘unwilling’. The Mann-Whitney U and Wilcoxon rank-sum were run on the overall data level (N=50) as well as on the villages’ level (N=19; N=18 and N=13). The advantage of using these tests was that the WTE (i.e. coded as ‘yes=0’; ‘no=1’) in the data did not have equal number of respondents neither on the overall data level nor on the individual village level.

The Mann-Whitney U and Wilcoxon W tests are used to test the differences between the median of comparable groups i.e. the willing and the unwilling concerning ‘benefit expectations’, ‘social pressure’, ‘ability’, ‘age’, and ‘income’ in the test on the overall data level (see 4.2) as well as individual villages (see 4.3.1, 4.4.1, and 4.5.1). These factors are measured on continuous scale⁴¹, therefore, the difference of their medians can be compared. The used method for calculating the significance is exact, time limit per test 5min. This method was used due to the small sample size (Field, 2009).

Cross-tabulation, Chi-square test

This test is supposed to be applied to analyze if the difference between categorical factors⁴² is significant. The minimum requirement of this test is that the expected count (not the observed count) has to be greater than five, otherwise the results are not reliable. Thus this function is possible to use to explore the relationship between ‘gender’ and WTE only on the overall data level (N=50). Due to the limited number of samples even on the overall data level ‘education’ and ‘occupation’ were not cross-tabulated with WTE. On the level of the individual villages it was not possible to cross-tabulate any on these factors i.e. ‘gender’, ‘education’ and ‘occupation’ factors and WTE due to the small sample size.

Factor analysis

This function is normally used in research to aggregate several influential variables into a smaller number of factors (Ramzan, 2008; Dolisca et al 2006; Field, 2009; Koellner et al., 2010). The aggregated variables under a certain factor mean that they represent the same information. Factor analysis was used to analyze if the different ES considered in this research would be grouped according to the classification of the MA (see 1.1.2) on the overall data level. Apart from that, it was used for analyzing the aggregation of different variables of the ‘social pressure’ factor.

For grouping the variables into interpretable factors, the following methods were chosen:

- Extraction method: Principal component, Based on Eigenvalue greater than 1
- Rotation method: Varimax (Field, 2009)

⁴⁰Not to be confused with Wilcoxon test.

⁴¹For example, someone who is 50 years old is older than some one who is 35 only.

⁴²For example, male is coded as 1 and female as 2, but 2 is not greater or higher than 1.

Factor analysis was also used for grouping the ES for *Vuzh* village, where SBA implementation is taking place. It was aimed to compare the factor analysis outcome on the overall data level with the outcome of the survey in *Vuzh*. Such comparison allows to conclude if local people's beliefs about the importance of ES and their expectations of these ES in the time frame of SBA are influenced by the real implementation measures, conducted (see 4.6).

3.6 Villages and plots of the case studies

3.6.1 Chilizat village and Shendod plot

Chilizat village is located in 180km distance from Khorog at the border with Afghanistan, which is formed by the Panj river. Before the Soviet power in the place of today's *Chilizat* village there had been very a couple of households using limited area of arable land. Even today, the village consists of only 19 households. Most of the people make their living out of farming and livestock breeding. Since each household possesses only a very small piece of land ranging from 0.15 to 0.60 hectare a general insufficiency of farming land must be stated. The main cultivated crops are potatoes and wheat. In addition to this land, a small garden with fruit trees and trees for timber production belongs to each household.

Electricity is available all year round. However, the voltage of the provided electricity especially during winter time is so low that it is impossible to use it for heating and cooking. The heating season starts in October and lasts until April. Therefore, seven months of heating based on fuel are necessary and result in a high demand for fuel wood⁴³.

Shendod plot is located 500m north of the village of *Chilizat*. The total area of the *Shendod* plot is 6.6 hectare. The altitude is 2700masl. In 1975, a part of the *kolkhoz* (see 1.2.4) land was allocated to *Leskhoz* and later afforested. At this time, *Leskhoz* planted willow and poplars there. In the following years, sea-buckthorn was growing naturally. Since there were no illegal cuttings and no grazing on the plot, the trees grew very fastly that *Leskhoz* was able to harvest 10-12m³ fuel wood (Davlatbekov, 2011).

⁴³The average needed fuel wood for one household in Gorno Badakhshan is 2 m³ to 4m³ for spending one winter.



Fig. 17: Shendod plot. Photo: Mislimshoeva, 2011

In that period a channel coming from the neighboring village, which is located around 3,5km away, irrigated the plot. The channel was used to irrigate both the farming land and the forest plot. The channel was two times wider and deeper than it is today as it was well maintained on an annual basis. Since the area of the irrigated land and forest plot was comparatively small, the water was sufficient for irrigation. At that time, conflicts between farming land and forest land did not occur (see 1.2.4).

After the independence of Tajikistan a part of this area was redistributed to local people, a part remained as Leskhoz land, on which illegal cuttings and uncontrolled grazing took place. At present, the channel is only partly maintained to irrigate the farming land. The ditches are filled in with stones and sand. Therefore, today almost no irrigation water reaches the forest plot. However, seasonal water from the *Shendod* gorge is sometimes available during the period from June to August. It often carries high sediment freight or even comes as a destructive mudflow. All together today, the forest plot is completely degraded as a consequence of insufficient water supply, illegal cuttings and uncontrolled grazing. The soil is mostly stony and partly sandy (see Fig. 17). Planting season is April and due to strongly blowing winds the horizontal method of planting trees is recommended (see 3.7.3).

3.6.2 Imam village and Varkhedz plot

Imam village is located in the Shugnan district, 100 km East of Khorog. The village consists of 42 households. Local people are occupied mostly in farming and livestock breeding. Potatoes are the main cultivated crop. The farming land per household is larger than in *Chilizat* village. It ranges from 0.40 hectares up to 3 hectares. Due to the harsh climatic conditions, there are no gardens with fruit trees in the village.

Electricity is available during the whole year. However already from October local people start to heat using fuel wood, since the voltage of the provided electricity is very low and therefore not useable for

heating and cooking. The heating season lasts until April or May. The demand for fuel wood especially in winter is very high.

The *Varkhedz* plot is located 500m from *Imam* village. Its total area is 19 hectares. It is located at an altitude of 2,900masl. According to information from local people, this plot was a bare land before the 1960s. There was no forest due to the absence of an irrigation channel. In 1970's, *Leskhoz* started afforestation campaign here and already in the 1980's it was possible to harvest fuel wood on this plot.



Fig. 18: Varkhedz plot. Photo: Mislimshoeva, 2011

However, in 1986-87 by the decision of *Leskhoz* part of this area was allocated to the Landuse Committee and it was decided to convert the forest into farm land. A bigger channel was built from the gorge *Varkhedz* to irrigate the plot. However, the implementation of this plan did not succeed because of the collapse of the Soviet Union (see 1.2.4).

Today the part, which belongs to the Landuse Committee, is divided among the local people (see 1.2.3) and irrigated by the channel. The severely degraded area, which belongs to *Leskhoz*, lacks water because all ditches on the plot are filled up with sand⁴⁴. The soil is mostly stony but in the lower part, it is sandy. The planting season is April and the horizontal tree planting method is recommended (see 3.7.3). Currently, the plot is highly degraded as a result of insufficient water supply as well as uncontrolled cuttings and grazing. (see Fig. 18).

3.6.3 Sadvadg village and Sadvadg plot

Sadvadg village is located in the Vanj district in a distance of 195km from Khorog. There are 23 households in the village. Most of the people are occupied in agriculture i.e. livestock breeding, farming and horticulture. The area of farmland of each household is very low. It ranges from 0.15 to 0.30 hectares.

⁴⁴The responsibility for the farmland was handed over to local people, whereas the forest was kept under the control of the *Leskhoz* GBAO (see 1.3 and 2.1).

Only few households have 1 hectare of farmland. However, in contrast to *Chilizat* and *Imam* each household has a relatively big area of private gardens with fruit trees and poplars for timber production. The mild climate and productive soil allows bigger harvests in comparison to *Imam* and *Chilizat*.

Electricity is provided from the neighboring village by a small hydropower station. However, even in summer the voltage is so low that it seems impossible to use it for heating or cooking devices. Therefore, in this village in comparison to the other ones local people use fuel for heating during the whole year. As a consequence, the need for fuel wood is very high in all seasons.

Sadvadg plot is located 1-2km from *Sadvadg* village. The total area is 25 hectares. It is located at an altitude of 2,200masl. Since *Sadvadg* plot around 1,5km far from the village and located around 100m lower, there are not as many competing land uses at this plot as in *Shendod* and *Varkhedz* plots. The *Sadvadg* plot was forested until the independence of Tajikistan, since the irrigation channel of this plot, coming from the *Sed* gorge was well maintained and functioning during all seasons



Fig. 19: Sadvadg plot. Photo: Mislímshoeva, 2011

After the independence, the channel was no longer maintained. All small ditches filled up with stones and sand. The trees dried out and at the same time illegal cuttings took place. In the year 2000 a reforestation campaign was initiated by *Leskhoz*. However, already in 2001, due to the lack of finance for maintaining the channel, water could no longer reach the plot. Some small ditches and lines of horizontal planting can still be seen - a sign of this planting campaign. The soil is mostly stony and partly sandy. The planting season is at the beginning of March and both, horizontal and as well as vertical planting methods are very common in this area (see 4.2.6). Currently the plot is highly degraded as a consequence of a broken irrigation system and uncontrolled cuttings (see Fig. 19).

3.6.4 Vuzh village and Vuzh plot

Vuzh village is located in the Shugnan district, 60km East of Khorog. There are 35 households in the village. Local people are mostly occupied with farming and livestock breeding. The lack of arable land is visible in the village. The average size of land per household is only 0.50 hectares. People mostly grow potatoes and some wheat varieties. The harsh climatic conditions do not allow growing lots of fruits and vegetables. However, each household owns a relatively small garden where it grows timber trees.

As in *Imam* village, also *Vuzh* has readily available electricity during the whole year. Nevertheless, local people begin to use fuel for heating from October as the provided electricity is not useable for heating and cooking due to its very low voltage and considerable costs. The heating season lasts until April or May. The demand for fuel wood especially in winter is very high.

Vuzh plot is situated less than 1km from *Vuzh* village. The total area under SBA is 20 hectares. It is located at an altitude of 2,800m. In 1970, an afforestation campaign by *Leskhoz* took place on the *Vuzh* plot. During the 1980's *Vuzh* became one of the most profitable forest plots in the Shugnan district. The plot was very rich of poplar for timber production. Moreover, *Leskhoz* harvested more than seven tons of hay there.



Fig. 20: Vuzh plot. Photo: Mislimeshova, 2011.

Few remaining poplar trees on the plot are a clear indicator of the former poplar vegetation. Water for irrigation came from *Vuzh* gorge. A long channel was built and maintained annually. With the independence of Tajikistan, almost all trees were illegally cut down and the irrigation system was no longer maintained. As a result, today the plot is severely degraded (see Fig. 20).

The soil is mostly stony and partly sandy. The planting season begins in March and both, horizontal and as well as vertical planting methods are very common in this area (see 3.7.3).

The *Vuzh* plot and village differ from the three other plots/village (see 3.6.1, 3.6.2 and 3.6.3) because of the SBA implementation, which has already started here (see 1.3.3).

3.7 Common features for the rehabilitation of all plots

During the cost⁴⁵ estimations for fencing, channel rehabilitation and planting material provision of each plot it became evident that there are some characteristics, which are common for all plots. These common characteristics are applied when calculating the costs for the reforestation of each plot (see 4.3.2, 4.4.2 and 4.5.2).

3.7.1 Fencing

Under the current conditions in Gorno Badakhshan the main fencing material are sea-buckthorn (*Hippophae rhamnoides*) shrubs, as they are easily and readily established. When sea-buckthorn is planted along the fence, it becomes a natural fence after few years. Sea-buckthorn bushes of 1.5 to 2m height are fixed with two parallel horizontal sticks (see Fig. 21). The price for the necessary amount of sea-buckthorn for fencing is not included in the estimations, as it is an in-kind contribution by *Leskhoz*. However, the preparation and transportation is costly and must be calculated for the fencing of those plots, where not enough fencing material is available. The excavator⁴⁶ is estimated to be transported from Khorog to each plot for digging a base ditch (30cm x 30cm) for the fence. The ditch ensures that the fence remains stable for more than a few months, as strong wind and livestock can easily damage it.



Fig. 21: Common traditional fence for forests. Photo: Mislimshoeva, 2008

3.7.2 Irrigation

All chosen plots are located along larger rivers, however the ground water does not reach the entire plot. Therefore, channels are needed for irrigation. All small channels within each plot, where handwork is not sufficient are estimated to be dug with an excavator. The excavator has to be transported from Khorog to

⁴⁵All costs are converted from TJS (local currency) to EUR according to the National Bank of Tajikistan, from the 15th of June, 2011 (1EUR=6.66TJS) (NBT, 2011).

⁴⁶The excavator belongs to the *Leskhoz* and the running costs are supported by GIZ, thus must not be included in the calculation.

each plot. A truck will be used to transport the excavator. From these small channels, each tenant should to dig ditches to irrigate his/her individual plot.

3.7.3 Planting

The planting material provision costs are estimated for the first 3 years as the planting workload is divided for 3 years⁴⁷ under SBA (see 1.3.3). Planting material mainly consists of willow and poplar⁴⁸ saplings. The planting method is done both horizontally and vertically depending on the location of the plot. The vertical method is recommended for those places where there is a small probability of negative influence of cattle and where there is no strong wind blowing in spring. The 1.5-2 m saplings are placed at 25cm depth (see Fig. 22). On stony soils the horizontal method of planting is recommended. The advantage of this approach is that the plant is covered by soil and is not exposed to negative external influences, such as strong wind and grazing livestock. The saplings are of 1.5 to 3 m length with a diameter of 4 to 6 cm (Kosumbekov, 1991) (see Fig. 23).

The cost for saplings is excluded from the estimation, since it will be provided by *Leskhoz* free of charge from neighboring *Leskhoz* plots. However, as for fencing also for planting the preparation and transportation has been calculated, where necessary.



Fig. 22: Vertical planting. Photo: Nurmamadov, 2010



Fig. 23: Horizontal planting. Photo: Kosumbekov, 1970s

⁴⁷One third of the plot will be planted in the 1st year, 2nd half in the 2nd year and 3rd part in the 3rd year.

⁴⁸Only planting of willow and poplar costs are estimated here. The advantage of these varieties is that they persist in any poor soils (Jusufbekov, et al., 1972). However this will depend on the tenant's preferences. He/she might plant sea buckthorn, dog rose, fruit trees and/or hay.

4 Results

4.1 Demographic and socio-economic characteristics of the respondents

4.1.1 Gender

In the study, out of 50 interviewed persons on the overall data level, 70% were males and 30% females. (see Fig. 24). The higher number of males may be attributed to the cultural background of the people in the Tajik Pamirs, where it is perceived that forestry is generally task for males than females. Since all households were give advanced notice that the workshop in the village (see 3.3.2) will be about forest management, therefore, this may be the reason why more males than female appeared (see 5.1.4). However, on the village level this argument seems to be true only for *Imam* and *Sadvagd* villages. In the *Imam* village males comprised 68%, whereas females comprised 32%. In *Sadvagd* village ‘gender’ was divided into males and females with 94% and 6% respectively. As can be seen, the *Sadvagd* village had a more drastic difference between males and females. The cause for this might be that men are more traditional and women do not normally participate in the workshops equally with men especially when it concerns forestry. As for the *Chilizat* village, it displayed opposite trends of ‘gender’ participation to the overall percentage as well as to *Imam* and *Sadvagd* villages. Males comprised 32% and females 68%. According to the village leader, the time at which the workshop was conducted (see 3.4) was also a time where most of the men were either busy in the field or were away in the mountains with their livestock. “In our village in most cases women are the heads of the families. They represent the household in the same manner as do the men” he stated. Also migration issues play a role in the village (see 4.1.2 and 4.1.4).

The relationship of ‘gender’ and Willingness to Enroll in SBA on the overall data level (N=50) is described in chapter 4.2.6. It was not possible to analyze the relations between ‘gender’ and WTE on the individual village level due to the lack of cases (see 3.5).

4.1.2 Age

In order to categorize the ‘age’ of the respondents the following groups were created: ‘younger than 25’; ‘26-35’; ‘36-45’; ‘46-55’ and ‘older than 56’ (see Fig. 25). The majority of the total respondents were between 46-55 years old and older than 56 years, making up 30% and 34% of all respondents respectively. The smallest group, only 4% consisted of respondents younger than 25 years old. Despite the fact that the selection of interviewees may have been biased to a certain extent due to methodology (see 3.3.2), some probable reason for the absence of young people can be stated:

- There is an enormous labor migration of relatively young people to Russia due to the lack of job opportunities in the villages in Tajikistan. In most cases it is women, children and old men who are left in the villages (see 1.2.3).
- In the time frame when the interviews were conducted i.e. May and June, many young people were still absent due to education programs in the cities. However, even if they had been in the villages

and participated in the interviews, they would probably not be more willing to enroll, since they are not in the village most of the time of the year. Furthermore, it is the parents who are usually decision-makers in the family and the main workers in the forest, whereas the young people often only help from time to time when they are in the village.

This lack of young people due to these mentioned reasons is reflected in the individual villages, especially in *Imam* and *Chilizat* villages. Most of the respondents in *Imam* village were between 46-55 years old (42%) followed by 26% of respondents being older than 56 years. In *Chilizat* village this figure was even more extreme. More than half of the respondents were older than 56 years (54%) followed by between 26-35 and 36-45 years old (15% each). While conducting interviews from household to household in this village, it could be observed that there were almost no young people between 19-35 years old. According to the village leader, the main reason for this is the absence of jobs in the villages, thus young people have to leave in order to earn money to support their families.

In *Sadvadg* village it was slightly different. As can be seen from the graph, no single correspondent was younger than 25 in comparison to *Imam* and *Chilizat* villages, however interviewees between 26-35 and 46-55 years old had the same share as older than 56 years (28%, 33% and 28% respectively). The possible reason for this is that relatively fewer people migrating to Russia, as each household owns a piece of land where they work and harvest fruits or vegetables in order to sell them. ‘Income’ is therefore relatively high, thus local people do not have to migrate or earn money abroad (see 4.1.5).

‘Age’ was a significantly influential factor on WTE if looking at the overall data (N=50) (see 4.2.5) however, the picture is not that clear at the individual village level (see 4.3, 4.4 and 4.5).

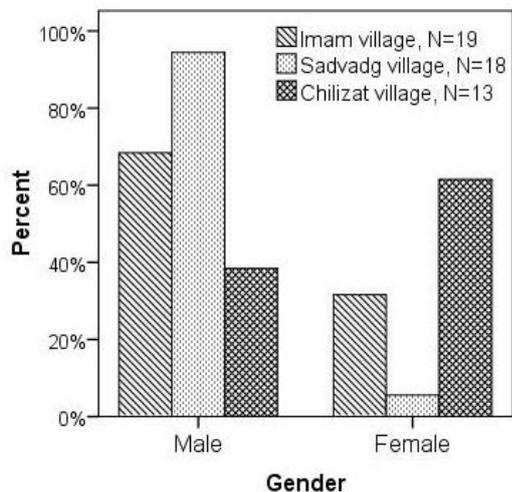


Fig. 24: Gender of the surveyed people.

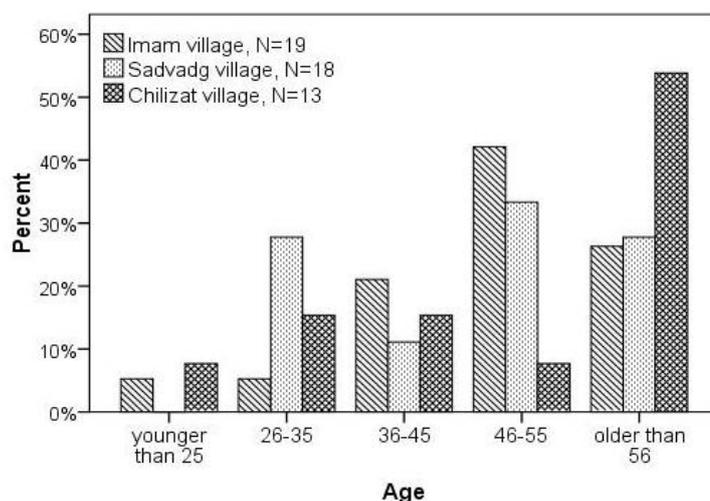


Fig. 25: Age of the surveyed people.

4.1.3 Education

The obtained data suggested the categorization of the ‘education’ of the respondents according to the following groups: ‘secondary school’ which includes both, 9 years and 11 years school; ‘college’ includes 3-4 years education after school at a technical school; ‘university’ 5 years education and ‘no education’ which means that the person had no education at all (see Fig. 26). Out of total 50 respondents, 50% had a college education. This is not surprising taking into account the relatively high ‘age’ of most of the

respondents (see 4.1.2). In the Soviet period, technical schools or colleges were the most common places to receive higher education.

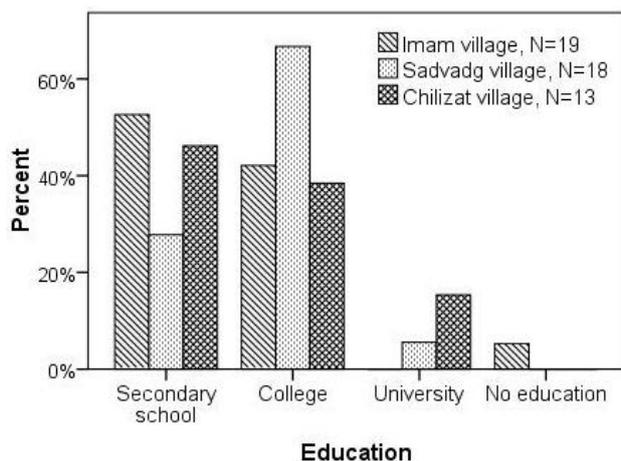


Fig. 26: Highest education of the surveyed people.

‘occupation’ of persons who went to colleges, 28% of them are unemployed at present. This is a good indicator for the lack of jobs in the villages.

Although on the individual village level these shares are slightly different, the reasons might be the same as for the overall level. In the *Imam* village the number of the interviewees who had secondary school as the highest level of education is 53% and who went to colleges is 42%. There were no respondents who went to university and there was only one person who had no education at all. In *Sadvadg* village the majority, 67% of the surveyed people went to colleges followed by those who went to secondary school (28%). In *Sadvadg* village as well in *Chilizat* village there was no person without any education. In *Chilizat* village a majority of 46% went to secondary school whereas 38% went to colleges.

The overall result shows that generally 98% of the respondents are able to read and write, i.e. at least finished secondary school (see 1.2.3). It is important to describe the educational background of the respondents, however due to the limited number of cases it was not possible to analyze the relationships between ‘education’ and WTE neither on the overall data level nor on the individual village level (see 3.5).

4.1.4 Occupation

Upon analyzing the raw data, the ‘occupation’ of the respondents were categorized according to the following groups: ‘Unemployed’ includes non-regular employment but with much higher wages; ‘Retired’⁴⁹ is pensioners with very low income; ‘Employed’ includes state employees with very low but regular wages; ‘private business’ is a business which is officially registered by the local state authorities (see Fig. 27). On the overall data level, the majority of the interviewees were unemployed (44%). This result reflects the given the socio-economic situation in the region (see 1.2.4), indicating that there are not enough jobs in the villages, which is also the main reason for migration (see 1.2.3). The number of retired

⁴⁹Retirement age for men is 63 and for women is 58 in Tajikistan (Falkingham et al., 2009).

and employed persons in the overall sample level was the same (22% each). Very few respondents held officially registered private businesses.

When looking at the monthly cash 'income' of unemployed interviewees, 41% of them stated their earnings to be more than 400TJS per month. In contrast, 36% of constantly employed persons stated their monthly 'income' was only 100 to 200TJS. This seemingly paradox situation can be explained by the fact that persons without permanent employment can earn money as contract laborers while teachers or administrative staff must rely on a constant but relatively low state-salary.

This general picture is true only for the *Imam* and *Sadvadg* villages. In both cases, the share of unemployed persons was comparatively high, with 58% and 39% respectively. *Chilizat* seemed to be very different from the two other villages. The share of retired persons (with 46%) is higher than the ones with without permanent employment (31%). This seems coherent, taking into consideration the high percentage of older people in this village (see 4.1.2).

In the current study, there are too few cases to analyze which role 'occupation' for WTE of the interviewed persons plays (see 3.5)?

4.1.5 Income

The data concerning the monthly 'income'⁵⁰ of the respondents were categorized according to the following groups: 'less than 100TJS'; 'from 100 to 200TJS'; 'from 200 to 300TJS'; 'from 300 to 400TJS'; 'more than 400TJS' (see Fig. 28 and footnote 45). Generally, it must be stated that the 'income' in all villages is very low and in all cases is around or below the poverty line (see 1.2.3). However, considerable differences between the households could be observed. Among the 50 interviewees the percentage of those who had a monthly 'income' from 100 to 200TJS (26%) and those who had more than 400TJS (28%) was almost equal. This shows that there was a group of people who were relatively better off and another comparatively poorer group. A third group whose 'income' ranged from 200 to 300TJS per month made up 18% followed by the poorest group earning less than 100TJS per month (16%). The 'income' of 12% of the respondents ranges between 300 and 400TJS.

However, it would not be appropriate to generalize the 'income' of three villages as a whole. It is obvious from the graph that in *Sadvadg* village the monthly 'income' was comparatively high. 72% of the interviewed people stated to have an 'income' of more than 400TJS per month. This might be related to 'age' and 'occupation' of the interviewees (see 4.1.2 and 4.1.4). It is also possibly attributed to the geographical location of the village and the favorable natural conditions of this region. The *Sadvadg* village is suitable for growing a great variety of fruits and vegetables (see 3.6.3). Selling of fruits and other agricultural products gives additional income opportunities to local people whereas people in *Imam* and *Chilizat* villages are much more limited in this respect (see 3.6.1 and 3.6.2). In the *Imam* village the majority of the interviewees earn less than 300TJS per month (79%). Only very few people had more than

⁵⁰The income factor represents monthly cash income of the household and not of the individual interviewee. Monthly cash income of the household can be a regular salary, private business, remittances from abroad etc.

400TJS per month. In *Chilizat* village most of the surveyed people must survive on a monthly ‘income’ of only 100 to 200TJS.

‘Income’ did not show any significant influence on WTE neither on the overall data level (see 4.2.5) nor on the individual village level (see 4.3, 4.4 and 4.5). The persons with low ‘income’ did not intend to enroll more than those whose ‘income’ was relatively high ‘income’ and vice versa.

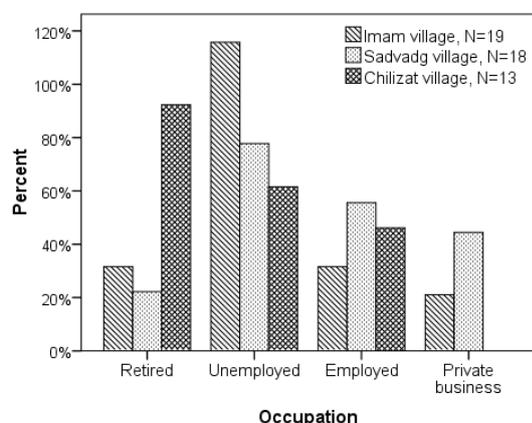


Fig. 27: Occupation of the surveyed people.

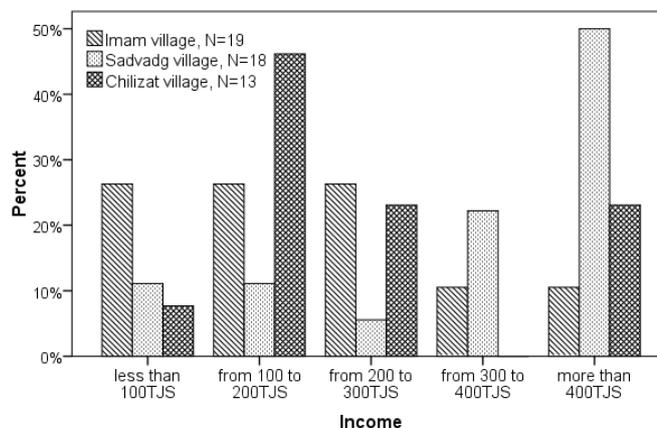


Fig. 28: Income per month of the surveyed people.

4.2 Factors influencing Willingness to Enroll

4.2.1 The overall data

Of the total surveyed persons (N=50), 31 were willing to enroll and 19 were not. Table 7 represents the WTE in SBA on the overall level as well as on the individual village level (N=19, N=18, N=13). WTE is a binary variable, labeled as willing to enroll by ‘yes’ and unwilling to enroll by ‘no’.

Table 7: Willingness to Enroll in Saving Book Approach

		WTE		Total	
		Yes	No		
Village	Imam village	Count	15	4	19
		Expected Count	11.8	7.2	19.0
		% within WTE	48.4%	21.1%	38.0%
	Sadvadg village	Count	9	9	18
		Expected Count	11.2	6.8	18.0
		% within WTE	29.0%	47.4%	36.0%
	Chilizat village	Count	7	6	13
		Expected Count	8.1	4.9	13.0
		% within WTE	22.6%	31.6%	26.0%
Total	Count	31	19	50	
	Expected Count	31.0	19.0	50.0	
	% within WTE	100.0%	100.0%	100.0%	

Even though 19 persons were not ‘willing’ to be enrolled in SBA, they agreed to answer all questions. Having such a comparable data, it was possible to apply necessary tests in order to determine the factors influencing people’s WTE (see 3.5). Based on the model of TPB for this research (see Fig. 15) ‘benefit expectations’, ‘social pressure’ and ‘ability’ are included in the model as predictors or more precisely as influential factors on WTE, which is the dependent variable or intention. The binary logistic regression

was used for the overall data level analysis (see 3.5). The factors included in the TPB model are shown in the Table 8.

Factor	Definition
Benefit expectations	the importance of ES (food, fuel wood, fodder for livestock, water regulating and erosion control function, aesthetic and recreation values) to the interviewee and his/her expectations of receiving these ES in the framework of SBA (see 1.3 and 1.1.4)
Social pressure	the importance of SBA implementation to other groups of people (family members, neighbors, <i>Leskhoz</i> and GIZ, Village Organization) and how important is the social pressure to the interviewee by these different groups (see 1.1.4)
Ability	the believe of the interviewee if he/she (incl. his family members, who could have the ability) has the ability (time availability, physical ability and availability of labor force) to fulfill the workload under SBA (see 1.1.4)
Willingness to Enroll (WTE)	WTE in SBA on household level

4.2.2 Benefit expectations and Willingness to Enroll

‘Benefit expectations’ included the ES (see Table 5). The results of the binary logistic regression show that ‘benefit expectations’ did not have any influence on WTE in SBA (see Table 11). Even though ‘benefit expectations’ were not generally an influential factor, it was still worthwhile to look at the different ES separately. To do so, first, the factor analysis function in SPSS was used to analyze if the different ES were aggregated according to the MA classification (see 1.1.2 and 3.5). Table 9 shows the outcome of this analysis. It can be seen that the evaluated ES were very well aggregated in three factors⁵¹, which perfectly fits with the MA classification, by provisioning services, regulating services and cultural services. The high values show a direct correlation of a certain variable with a certain factor. Food (see Table 5) variable as one of the provisioning services was excluded because it did not seem to have any meaningful correlation with any of the three factors.

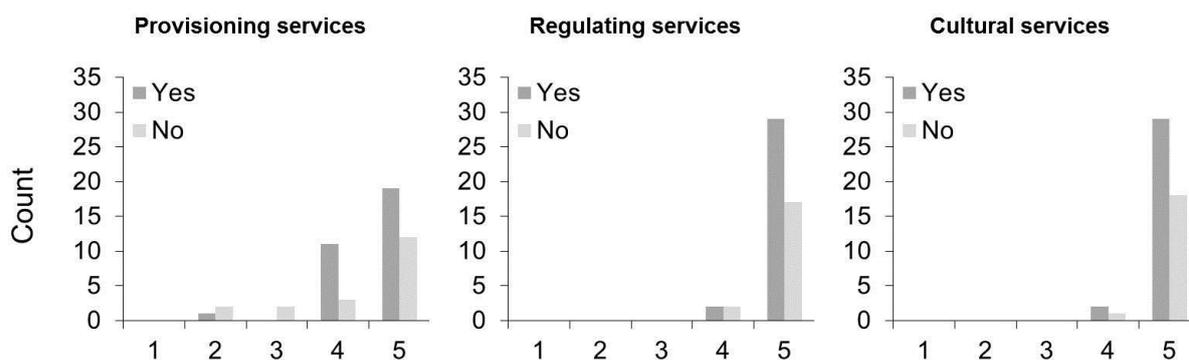
	Component or Factor		
	Regulating Services	Cultural Services	Provisioning Services
Fuel wood	.067	.107	.791
Fodder for livestock	.073	-.107	.788
Water regulation	.964	.227	.098
Erosion control	.974	.187	.086
Aesthetic value	.223	.958	-.019
Recreation	.184	.960	.018

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 5 iterations., N=50

As the evaluated ES were very well classified, it was possible to run the Mann-Whitney U and Wilcoxon W tests (see 3.5) in order to analyze if there was a significant difference between the ‘willing’ and ‘unwilling’ persons in terms of their beliefs on the importance of ES and their expectations concerning these services in the framework of SBA. Fig. 29 represents the number of persons who were ‘willing’ and

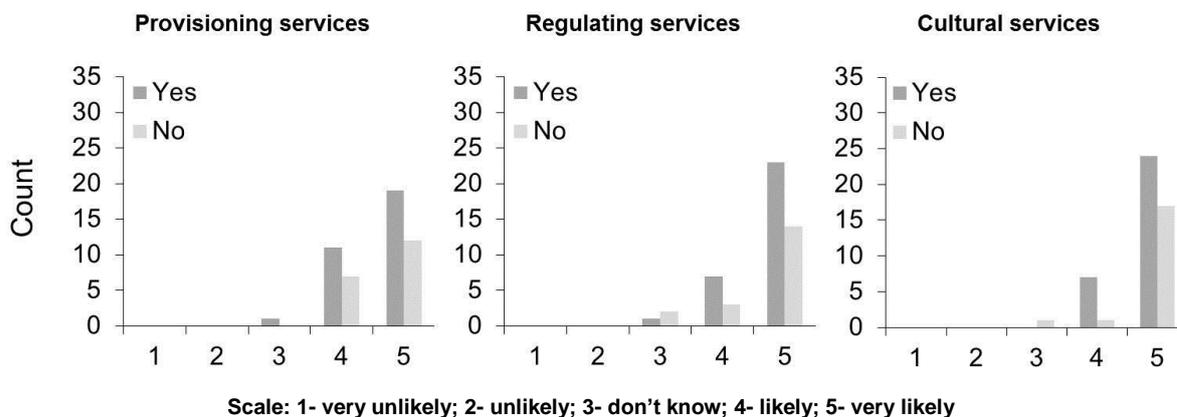
⁵¹In SPSS factors are called components.

‘unwilling’ to enroll in SBA as well as their beliefs about the importance of ES to them. It can be noted from the graph, that the importance of ES is mostly valued on a very high scale, i.e. 4 - important and 5 - very important. The same pattern can be observed for expected ES in the time frame of SBA (see Fig. 30). The graph shows that most of the interviewees believed that it is likely that in the time frame of SBA that the rehabilitated forest plot will provide the mentioned ES, regardless of their WTE in SBA. However, the figures suggest that the ‘willing’ gave higher values to the importance of ES and expected ES, the Mann-Whitney U and Wilcoxon W tests did not show any significant difference between the two groups.



Scale: 1-very unimportant; 2- unimportant; 3- neither important nor unimportant; 4- important; 5- very important⁵².

Fig. 29: Perceived importance of Ecosystem Services. ‘Willing’ and ‘unwilling’ to enroll are marked by ‘Yes’ and ‘No’, N=50.



Scale: 1- very unlikely; 2- unlikely; 3- don't know; 4- likely; 5- very likely

Fig. 30: Expectations of Ecosystem Services in the time frame of the Saving Book Approach. ‘Willing’ and ‘unwilling’ to enroll are marked by ‘Yes’ and ‘No’, N=50.

The diagrams show that regulating services and cultural services were considered more important to the interviewed persons than provisioning services. This, at a first glance, seems surprising, as provisioning services, especially fuel wood, (see Table 5) are necessary for survival and livelihood in the region. The reason for the lower values for provisioning service is that generally, interviewees valued the importance of food services (see Table 5) in a form of berries on a relatively low scale, i.e. they did not perceive food

⁵²The values, both graphs are based on are averages of values given by each interviewee on a scale from 1 to 5 (e.g. for the provisioning services: the value ‘Importance of NTFP to me’ + the value of ‘Importance of fuel wood to me’ + the value of ‘Importance of fodder for livestock to me’ / 3 = average) (see 3.5 and see Appendix 1).

as an important service to them. Thus, the low values given by the interviewees for food, generated comparatively low values for provisioning services as a whole. This does not mean that fuel wood and fodder for livestock are less important to local people. If looking closer at each component of the provisioning services separately, it becomes evident that fuel wood and fodder for livestock are as much important as other ES.

“Nowadays we have to spend a lot of money to go to other villages for buying fuel wood. Wouldn’t be it greater if we would have a forest in our village and collect fuel wood from directly there!?”
(interviewee in Vuzh village).

The results on the future expectations concerning ES from SBA show the same effect (see Fig. 30). People rank the expected regulating and cultural services from their participation in SBA higher than provisioning services, although provisioning services bring concrete economic advantages for the individual tenant. This, to a certain extent, seems to be related to the described effect of the food services. It however, might be also related to the uncertainties people see in the potential of SBA to really provide useable forest products. At the same time, the trust of local people in State institutions such as *Leskhoz* as well as in respective use agreements needs time to develop (see 1.3.3).

4.2.3 Social pressure and Willingness to Enroll

The ‘social pressure’ factor represents groups of people who could potentially influence the interviewees’ decision of enrollment or non-enrollment in SBA. These groups were family members, neighbors, *Leskhoz* and GIZ as well as the Village Organization (VO). The regression showed that ‘social pressure’ did not have any influence on WTE on the overall data level (see Table 11). Generally, all interviewees perceived the importance of SBA’s implementation to other groups of people in the same way. This is why the included variables for this statement were aggregated very well during the factor analysis (see Table 10 and Fig. 31). The pressure on the interviewee by these different groups of people also showed the same pattern of aggregation.

“In this socio-cultural context it is impossible not to care about the opinion of your family, neighbors and other groups of people. I guess it matters to everyone!?” (interviewee in Imam village).

Table 10: Factor analysis’ outcome for social pressure.

	Component or Factor	
	Importance of SBA’s implementation to different group of people (A, B, C, D)	Pressure on me of my enrollment in SBA by different group of people (E, F, G, H)
A. Family members	.880	-.047
B. Neighbors	.891	.006
C. <i>Leskhoz</i> supported by GIZ	.860	.058
D. Village Organization	.883	-.175
E. Family members	-.057	.794
F. Neighbors	.016	.545
G. <i>Leskhoz</i> supported by GIZ	-.075	.514
H. Village Organization	.016	.793

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 3 iterations., N=50

This indicates that all interviewees cared about the influence by their social environment in a similar manner. It becomes clear that family members and VO are considered to have more influence on the decision-making of the interviewee than neighbours and *Leskhoz* and GIZ. Even when applying the Mann-Whitney U and Wilcoxon W tests no significant differences between the ‘willing’ to enroll and the ‘unwilling’ was observed.

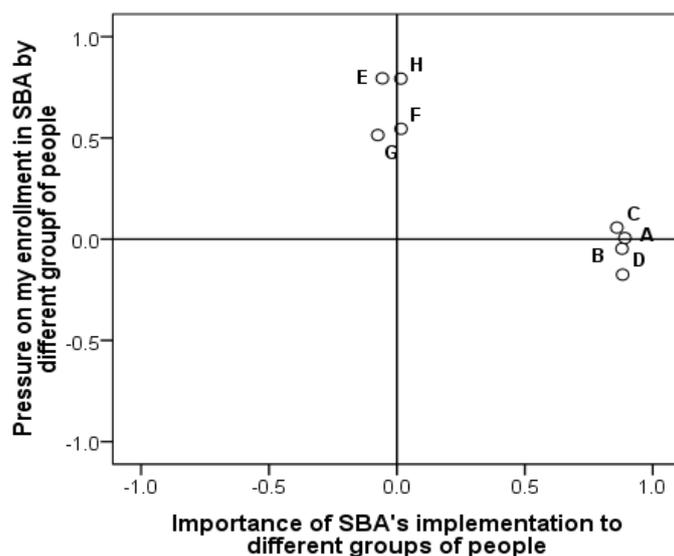


Fig. 31: Graphical representation of factor analysis, N=50.

4.2.4 Ability and Willingness to Enroll

The regression results show that ‘ability’ was the only significant predictor of WTE in SBA on the overall data level (see Table 11). This means that the main reason of local people’s willingness or unwillingness to enroll in SBA was dependent on the ‘ability’ i.e. time availability, physical ability and availability of labor force they had (Sig. .000; $p < .001$).

“By profession, I am a driver. However, at the moment do not have any job and very soon I will be retired. I don’t know where my pension will come from. I am searching for a job... My sons are in Russia and probably will not be back soon. My wife is not able work physically. I appreciate forestry, but I know that I our family will not able to fulfill the workload” (interviewee in Imam village).

Table 11: Outcome of the binary logistic regression on benefit expectations, social pressure, ability and Willingness to Enroll.						
	B (SE)	Wald	Sig.	Odds Ratio	95% C.I.for Odds Ratio	
					Lower	Upper
Benefit expectations	.033 (.038)	.770	.380	1.034	.960	1.113
Social pressure	-.023 (.042)	.300	.584	.977	.901	1.061
Ability	.137 (.039)	12.460	.000*	1.147	1.063	1.237
Constant	-8.091 (5.559)	2.118	.146	.000		

Note: N=50, $R^2=.6$ (Hosmer and Lemeshow), .6 (Cox and Snell), .76 (Nagelkerke). Model $X^2(1)=41.1$, * $p < .001$

Of three factors included in the TPB model (see Fig. 15), ‘ability’ is the only and the most influential factor on intention, i.e. WTE in SBA. However, this outcome has to be interpreted with caution, as the sample used for this analysis consisted of the interviews in the three different villages. Therefore, this generalized assumption might not be relevant if looking at each village individually, as the TPB model in

the context of this research did not include demographic and socio-economic factors directly. Even if the model would have included such factors, it might not have been appropriate, because as the demographic and socio-economic factors showed the representation of the overall data level is not necessarily the same on the individual village level. Furthermore, it is worthwhile to get a general understanding of the overall data although, the main aim of this research is to determine the influential factor on WTE on the village level. In order to overcome these misinterpretations and to follow the aim of this research, the Mann-Whitney U and Wilcoxon W tests were used to test the differences between the median of comparable groups i.e. those ‘willing’ and the ‘unwilling’ to enroll in SBA including ‘benefit expectations’, ‘social pressure’, ‘ability’, ‘age’, and ‘income’ in the test on the overall data level (see 4.2) as well as individual villages (see 3.5, 4.3.1, 4.4.1 and 4.5.1). Cross-tabulation is used in order to explore the relationships between ‘gender’ and WTE on the overall data level (see 3.5).

4.2.5 Age, income and Willingness to Enroll

As Table 12 shows (see Table 8 for the explanation of the included variables), the Mann-Whitney U and Wilcoxon W tests (see 3.5) results reveal that the ‘willing’ and the ‘unwilling’ to enroll in SBA differed from each other not only by their ‘ability’, as it turned out in the logistic regression, but also by their ‘age’. The ‘willing’ group (Median=12) was significantly less restricted by time availability, physical ability and availability of labor force than the ‘unwilling’ group (Median=60), $U=24.00$, $W_s = 520.00$, $z=-5.56$, $p<.01$, $r= -0.11$. In terms of ‘age’ the ‘willing’ group (Median=46) was significantly younger than the ‘unwilling’ group (Median =54), $U=209.00$, $W_s = 705.00$, $z= -1.71$, $p<.05$, $r= -0.03$ (see 4.1.2).

“My three sons are in Russia... One of them has three children. I am 65 years old person... His wife is working and I am the only person who is taking care of the children at home...” (interviewee in Imam village).

Table 12: Significance test on factors and Willingness to Enroll, N=50.

Test statistics, grouping variable: WTE					
	Benefit expectations	Social pressure	Ability	Age	Income
Mann-Whitney U	289.000	260.000	24.000	209.000	244.500
Wilcoxon W	479.000	450.000	520.000	705.000	740.500
Z	-.111	-.702	-5.565	-1.711	-1.026
Exact Sig. (1-tailed)	.458	.245	.000*	.044**	.153
Mann-Whitney U and Wilcoxon W test statistics. Grouping Variable: WTE coded as ‘yes’ and ‘no’, N=50 Method for significance calculation: Exact, time limit per test 5min. * $p<.001$ and ** $p<.05$.					

The overall data suggests that the probability for enrollment in SBA rises when a special ‘ability’ and ‘age’ of the potential household is given. This means that a person who was going to be enrolled in SBA tends to have the following characteristics:

- provide labor force, which has time and is physically fit in order to fulfill the workload under SBA
- is younger than 46 years old as the test show. Interviewed people older than 46 years were not willing to enroll. A possible explanation for this could be that they believed that they would not be able to fulfill the workload under SBA. However the discussion of this result need to be interpreted with caution (see 5.1.5).

Other variables included in the test on the overall level did not turned out to be influential. This means that people willing to be enrolled in SBA are not necessarily characterized by:

- high ‘benefit expectations’ in comparison ‘unwilling’ to enroll
- special pressure felt by their social environment
- a certain ‘income’ per month

Fig. 32 depicts a graphical representation of the variables included in the Mann-Whitney U and Wilcoxon W tests (see 4.1 and 4.2). The values used in Table 12 and in the graphs of Fig. 32 are based on the equation 1 of the TPB (see 1.1.4). The number of ‘benefit expectations’ questions in the questionnaire were higher than the number of ‘social pressure’ questions, followed by the number of ‘ability’ questions. Therefore the values on the y-axis are higher for the ‘benefit expectations’ factor than the ones of ‘social pressure’ or ‘ability’.

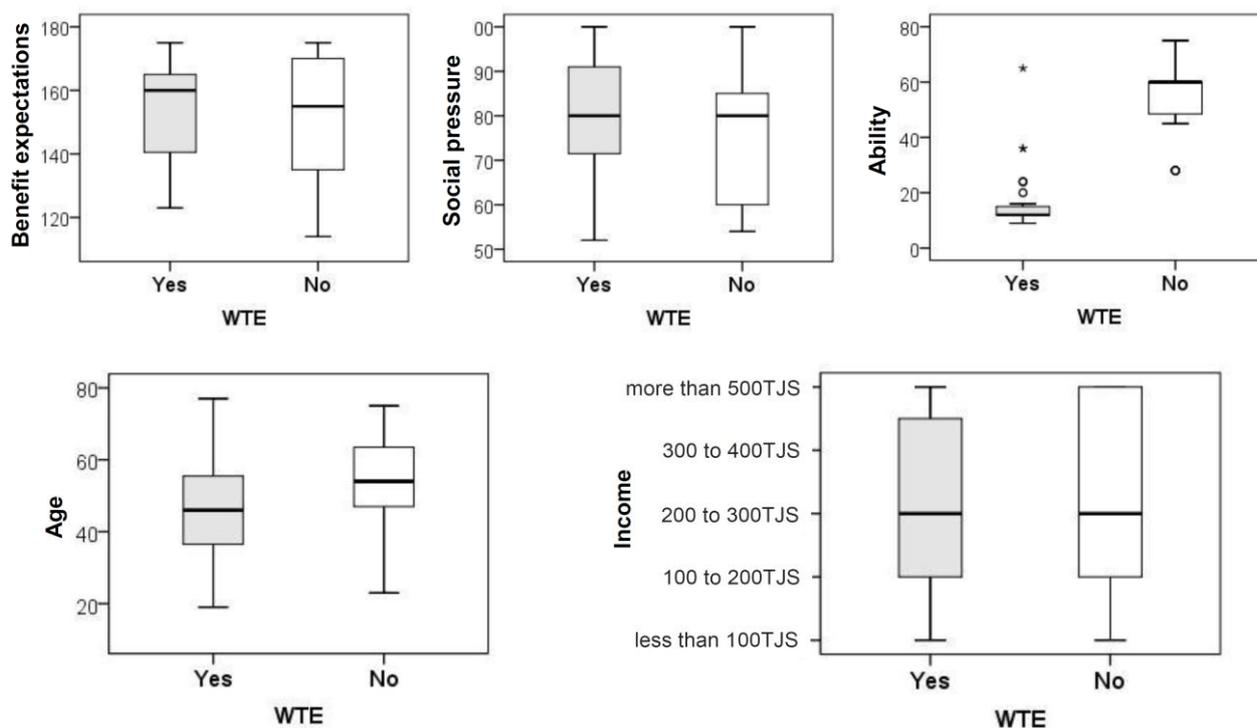


Fig. 32: Graphical representation of used variables for Mann-Whitney U and Wilcoxon W tests.

4.2.6 Gender and Willingness to Enroll

Table 13 contains the number of cases that fall into each combination in the cells. On the overall data level 31 persons were ‘willing’ to enroll in SBA (62%) and of these 24 are male (77.4%) and 7 female (22.6%). 19 persons were ‘unwilling’ (38%); 11 of them were males (57.9%) and 8 females (42.1%). Based on the significance value it can be stated the ‘gender’ and WTE seem not to have any associations on the overall data level.

“In our village, for example, in the farmland men and women work equally. There is no separation in this issue” (Imam village’s leader).

		WTE		Total
		Yes	No	
Male	Count	24	11	35
	Expected Count	21.7	13.3	35.0
	% within WTE	77.4%	57.9%	70.0%
	% of Total	48.0%	22.0%	70.0%
Female	Count	7	8	15
	Expected Count	9.3	5.7	15.0
	% within WTE	22.6%	42.1%	30.0%
	% of Total	14.0%	16.0%	30.0%
Total	Count	31	19	50
	Expected Count	31.0	19.0	50.0
	% within WTE	100.0%	100.0%	100.0%
	% of Total	62.0%	38.0%	100.0%

Asymp. Sig. .14

4.3 Chilizat village

4.3.1 Results of the survey

As with the overall data level (N=50), also in *Chilizat* village (N=13) the results of the Mann-Whitney U and Wilcoxon W tests showed that ‘ability’ was the only variable or factor which distinguishes the two groups - the ‘willing’ and the ‘unwilling’ (see Table 14). The ‘willing’ to enroll group (Median =12) was significantly less restricted by time availability, physical ability and availability of labor force than the ‘unwilling’ group (Median =53); U=.00, $W_s = 28.00$, $z = -3.11$, $*p < .01$, $r = -0.23$. Fig. 35 shows the difference between the two groups. With regards to other influencing factors included in the test, the two groups did not differ from each other, i.e. their enrollment in SBA did not depend on their ‘benefit expectations’, ‘social pressure’, ‘age’ or ‘income’.

Test statistics, grouping variable: WTE					
	Benefit expectations	Social pressure	Ability	Age	Income
Mann-Whitney U	17.000	20.500	.000	19.000	12.000
Wilcoxon W	45.000	48.500	28.000	47.000	40.000
Z	-.580	-.074	-3.109	-.286	-1.369
Exact Sig. (1-tailed)	.297	.483	.001*	.418	.130

Mann-Whitney U and Wilcoxon W test statistics. Grouping Variable: WTE coded as ‘yes’ and ‘no’, N=13
Method for significance calculation: Exact, time limit per test 5min. * $p < .01$.

4.3.2 Cost estimations for Shendod plot

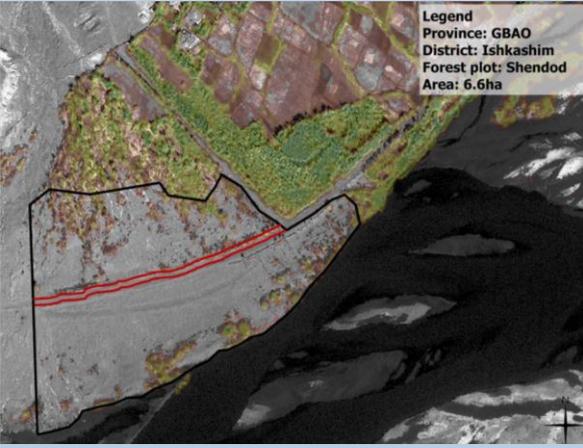
Fencing costs

The *Shendod* plot is divided into two parts as a public road cuts the plot in the middle. The red line in Box 3 indicates the road along which an additional fence will need to be established. The total length of the projected fence is 1740m. This also includes fencing from the riverside, as livestock can easily cross the river to reach the plot. A total volume of 696m³ of sea-buckthorn has been calculated as necessary to enclose the plot. However, this volume of sea-buckthorn is not available, even in the more densely

vegetated areas of the plot, situated north of the prospected SBA area. For this reason, fencing material needs to be brought from the 15km away *Nizhgar* forest plot (see 3.7.1).

Box 3: Fencing costs and scheme, Shendod plot (6.6ha) (Davlatbekov and Mislimgshoeva, 2011).

	TJS	EUR
Labor force costs (including collection of thorn and wooden sticks by hand, installing of fence by hand)	6,164	926
Transportation costs (including truck rental for transporting the fencing material, truck rental for transporting the excavator, digging base for the fence, purchasing fuel for all these activities, driver salary)	7,620	1,144
Material costs (including wire for assembling the fence)	522	78
Total costs for fencing	14,306	2,148
Cost per ha	2,168	325

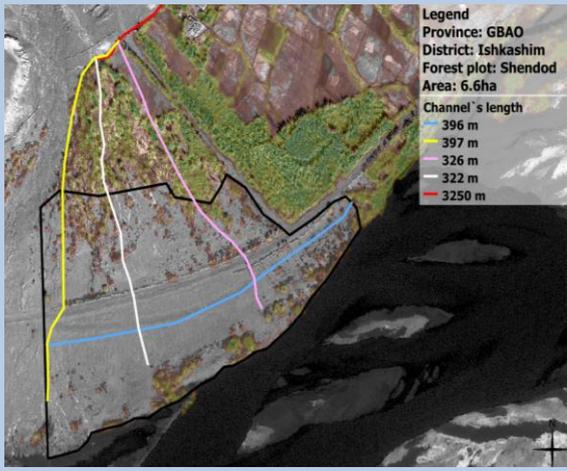


Channel rehabilitation costs

The costs for channel rehabilitation encompassed the repairing and enlargement of the main channel, coming from the neighboring village to *Chilizat* village. The channel is currently used for irrigating the agricultural land. The total length of the channel is 3250m (see 3.6.1). In this case reparation means that the channel needs to be partly deepened and partly widened in order to increase the water discharge to irrigate both the agricultural land and the forest plot. This work is projected to be implemented by manpower, as the steep slope prevents the use of an excavator. Four new small channels with a total length of 1441m will have to be equally distributed on the plot (see Box 4). In order for water to pass underneath the road former trenches, which are currently full of mud and gravel, will have to be rehabilitated.

Box 4: Channel rehabilitation costs and scheme, Shendod plot (6.6ha) (Davlatbekov and Mislimgshoeva, 2011).

	TJS	EUR
Labor force costs (including construction work by hand with stones and gabion, repairment of the channel and trenches by hand, installing diversion by hand)	23,856	3,582
Transportation costs (including truck rent for transporting the construction material, truck rent for transporting the excavator, digging the channel by excavator, fuel for all these activities, driver salary)	5,622	844
Material costs (including diversion weir and cement)	21,010	3,155
Total costs for channel's rehabilitation	50,488	7,581
Cost per ha	7,650	1,149



Planting costs

Even in the more forested parts of *Shendod* plot, outside of the SBA area, there is not enough planting material for the reforestation of the deserted territories available. Similarly as for fencing, also the planting material is projected to be prepared and transported from *Nizhgar* plot, which is located 15km away from *Shendod* plot. Table 15 shows the costs for preparing of saplings and their transportation. Recommended planting methods for this region are described in 3.6.1 and 3.7.3.

Table 15: Cost estimations for planting material provision, Shendod plot (6.6ha) (Davlatbekov and Mislimshoeva, 2011).

	TJS	EUR
Labor force costs (including cutting and preparing of saplings by hand, planting saplings)	369	55
Transportation costs (including truck rental for transporting the saplings, fuel, driver salary)	374	56
Total costs for provision planting material and planting	743	111
Cost per ha	113	17

4.4 Imam village

4.4.1 Results of the survey

The results of the Mann-Whitney U and Wilcoxon W tests for the *Imam* village data (N=19) did not differ from the results for the overall data (see 4.2). The only difference between ‘willing’ and ‘unwilling’ persons was the ‘ability’ factor. The ‘willing’ to enroll group (Median=15) was significantly less restricted by time availability, physical ability and availability of labor force than the ‘unwilling’ to enroll (Median =68); U=2.00, $W_s = 122.00$, $z = -2.84$, $*p < .01$, $r = -0.15$ (see Table 16 and Fig. 35). It seems that ‘benefit expectations’, ‘social pressure’, ‘age’ and ‘income’ did not have any influence on the WTE of local people in *Imam* village.

Table 16: Significance test on factors and Willingness to Enroll, N=19.

Test statistics, grouping variable: WTE					
	Benefit expectations	Social pressure	Ability	Age	Income
Mann-Whitney U	24.500	26.500	2.000	15.000	24.500
Wilcoxon W	34.500	36.500	122.000	135.000	144.500
Z	-.555	-.355	-2.841	-1.505	-.566
Exact Sig. (1-tailed)	.302	.374	.001*	.074	.336

Mann-Whitney U and Wilcoxon W test statistics. Grouping Variable: WTE coded as ‘yes’ and ‘no’, N=19
Method for significance calculation: Exact, time limit per test 5min. * $p < .01$

4.4.2 Cost estimations for Varkhedz plot

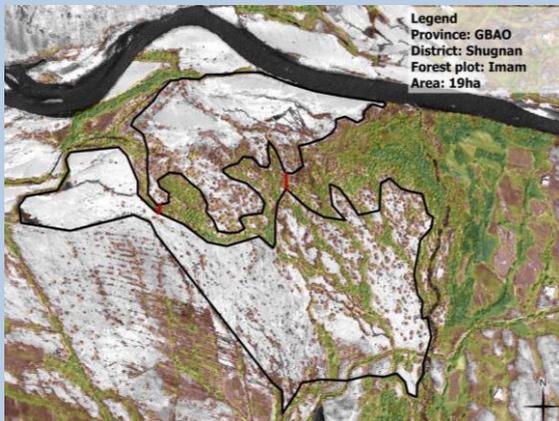
Fencing costs

The still forested part of *Varkhedz* plot was not included in SBA. Therefore, two separate plots need to be fenced (see Box 5). The total area is 19ha. In order to reduce the fencing costs it was decided to fence the plot as a whole and not the divided parts, separately. In Box 5 the two red lines indicate the stretch, where the fences of the two separated plots would be connected. This measure would include a relatively densely forested part in the fenced territory. However, it will not be part of SBA. The plot will have to be fenced even towards the river, as livestock from adjacent villages can easily cross the river and reach the plot. The total length of the fence is 2850m. A total volume of 1140m³ of sea-buckthorn is needed to

fence the plot. Such a volume of sea-buckthorn is not available even in the more densely vegetated areas of the plot. Therefore, fencing material will be transported from the *Morj* forest plot, which is located 12km away from *Varkhedz* plot (see 3.7.1)

Box 5: Fencing costs and scheme, Varkhedz plot (19ha) (Fozilov and Mislimgshoeva, 2011).

	TJS	EUR
Labor force costs (including collection of thorn and wooden sticks by hand, installing of fence by hand)	10,096	1,516
Transportation costs (including truck rental for transporting the fencing material, truck rental for transporting the excavator, digging base for the fence, purchasing fuel for all these activities, driver salary)	9,201	1,382
Material costs (including wire for assembling the fence)	855	128
Total costs for fencing	20,152	3,026
Cost per ha	1,061	159

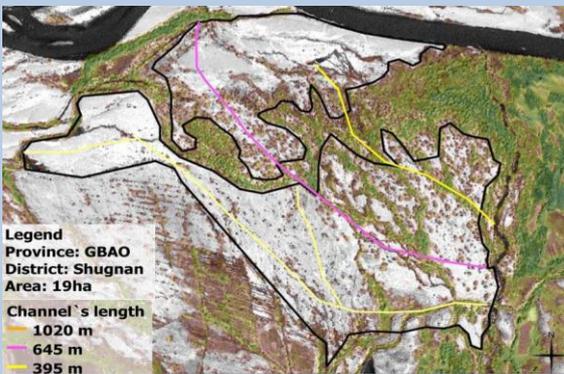


Channel rehabilitation costs

The former irrigation channel of the plot still exists in part. The water coming from the gorge will simply need to be redirected towards the plot instead of directly discharging into Gunt river. For the redirection of the water as well as digging out small channels on the plot the use of an excavator was considered (see 3.5). No materials aside from the tubes for passing the water underneath another channel are calculated. Box 6 describes the channel scheme and the costs for rehabilitation of the channel.

Box 6: Channel rehabilitation costs and scheme, Varkhedz plot (19ha) (Fozilov and Mislimgshoeva, 2011).

	TJS	EUR
Labor force costs (installing the tube)	40	6
Transportation costs (including truck rent for transporting the tubes, truck rent for transporting the excavator, digging the channel by excavator, fuel for all these activities, driver salary)	4,906	737
Material costs (including tubes)	560	84
Total costs for channel's rehabilitation	5,506	827
Cost per ha	290	44



Planting costs

Planting material of the required quality i.e. willow and poplar saplings are not available even in the more forested area of *Varkhedz* plot. Therefore, planting material will have to be prepared and transported from *Morj* plot, 12km away from *Varkhedz* plot (see Table 17). Recommended planting methods for this region are described in 3.6.2 and 3.7.3.

Table 17: Cost estimations for planting material provision, Varkhedz plot (19ha) (Fozilov and Mislimshoeva, 2011).

	TJS	EUR
Labor force costs (including cutting and preparing of saplings by hand, planting saplings)	1,056	159
Transportation costs (including truck rental for transporting the saplings, fuel, driver salary)	896	135
Total costs for provision planting material and planting	1,952	294
Cost per ha	103	15

4.5 Sadvadg village

4.5.1 Results of the survey

The results of the Mann-Whitney U and Wilcoxon W tests for the overall data level (N=50) are reflected in the same pattern in *Sadvadg* village (N=18) (see 4.2.4). Also here, ‘ability’ was the only distinguishing factor between the ‘willing’ and ‘unwilling’ groups. The group ‘willing’ to enroll group (Median =12) was significantly less restricted by time availability, physical ability and availability of labor force than the ‘unwilling’ group (Median =60); U=.00, $W_s = 45.00$, $z = -3.78$, $*p < .001$, $r = -0.21$ (see Table 18 and Fig. 35). Based on the outcome of this Mann-Whitney U and Wilcoxon W test results, it can be stated that that ‘benefit expectations’, ‘social pressure’, ‘age’ or ‘income’ did not have any influence on WTE in *Sadvadg* village (see Fig. 35).

Table 18: Significance test on factors and Willingness to Enroll, N=18.

Test statistics, grouping variable: WTE					
	Benefit expectations	Social pressure	Ability	Age	Income
Mann-Whitney U	37.500	39.000	.000	28.000	34.500
Wilcoxon W	82.500	84.000	45.000	73.000	79.500
Z	-.268	-.143	-3.787	-1.106	-.570
Exact Sig. (1-tailed)	.404	.438	.000*	.143	.302
Mann-Whitney U and Wilcoxon W test statistics. Grouping Variable: WTE coded as ‘yes’ and ‘no’, N=18 Method for significance calculation: Exact, time limit per test 5min. * $p < .01$					

4.5.2 Cost estimations for Sadvadg plot

Fencing costs

The situation in the *Sadvadg* plot was different than in the *Shendod* and *Varkhedz* plots. The *Sadvadg* plot is partly forested (see Box 7). Therefore, the fencing material for the SBA area can be provided directly from the forested part of the plot. Accordingly, there was no cost estimation needed for the transportation of the fencing material itself. The transportation costs cover only the transport of the excavator from Khorog to *Sadvadg* and back (390km). The total length of the fence to be established is 2600m. It also includes the fencing of the plot at the riverside. A total of 1040 m³ of sea-buckthorn is projected to be necessary to fence the entire plot (see 3.7.1)

Box 7: Fencing costs and scheme, Sadvadg plot (25ha) (Fozilov and Mislímshoeva, 2011).

	TJS	EUR
Labor force costs (including collection of thorn and wooden sticks by hand, installing of fence by hand)	8,393	1,260
Transportation costs (including truck rental for, transporting the excavator, digging base for the fence, purchacing fuel for all these activities, driver salary)	2,449	368
Material costs (wire for assembling the fence)	910	137
Total costs for fencing	11,752	1,765
Cost per ha	470	71

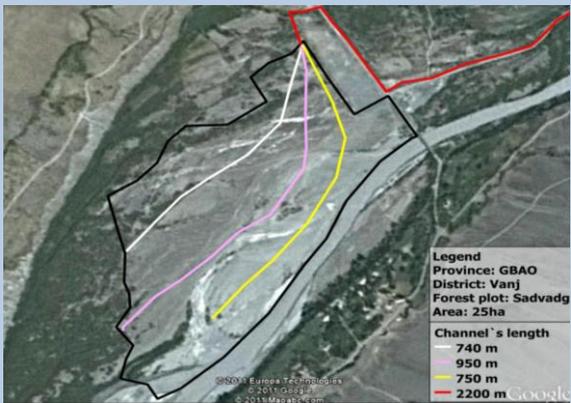


Channel rehabilitation costs

The main channel from the gorge *Sed* is 2200m long. At present it is used to irrigate a *Leskhoz'* nursery. In order to irrigate the forest plot this channel would have to be partly deepened and widened. The first 380m of the main channel were projected to be repaired by man power and the rest with help of an excavator. The total length of all channels on the forest plot is 2440 m, which is projected to be implemented by excavator (see Box 8).

Box 8: Channel rehabilitation costs and scheme, Sadvadg plot (25ha) (Fozilov and Mislímshoeva, 2011).

	TJS	EUR
Labor force costs (including removing the shrubs around the channel by hand, digging channel by hand)	4,729	710
Transportation costs (including, truck rent for transporting the excavator, digging the channel by excavator, fuel for all these activities, driver salary)	11,896	1,786
Total costs for channel's rehabilitation	16,625	2,496
Cost per ha	665	100



Planting costs

As for fencing material, the planting material can be directly harvested from the forested part of the plot. Respectively, no transportation costs were calculated (see Table 19). Recommended planting methods for this region are described in 3.6.3 and 3.7.3.

Table 19: Cost estimations for planting material provision, Sadvadg plot (25ha) (Fozilov and Mislímshoeva, 2011).

	TJS	EUR
Labor force costs (including cutting and preparing of saplings by hand, planting saplings)	1397	210
Total costs for provision planting material and planting	1397	210
Cost per ha	56	8

4.6 Saving Book Approach implementation in Vuzh

4.6.1 Demographic and socio-economic characteristics of the tenants

Table 20 summarizes the demographic and socio-economic characteristics of the respondents i.e. the JFM and SBA tenants in the *Vuzh* village (N=15). ‘Gender’ is the most remarkable factor in comparison to the three villages where the study was conducted i.e. *Chilizat*, *Imam* and *Sadvadg*. All tenants in *Vuzh* are males. In contrast, in the *Chilizat* and *Imam* villages roughly half of the female interviewees were ‘willing’ to enroll in SBA, if it would be implemented in their villages (see Table 13). However, this result deserves further discussion (see 5.1.4). If looking at with the results on the ‘age’ factor in *Vuzh*, the most distinct feature is that a majority (54 %) of tenants is older than 46, which contradicts the results of the overall data, where the vast majority of the ‘willing’ was younger than 46 years old (see 4.2.5).

Table 20: Demographics and socio-economic characteristics of the respondents.

	Variable	Count	%
Gender	Male	15	100
	Female	0	0
Age	younger than 25	1	6
	26-35	3	20
	36-45	3	20
	46-55	4	27
	older than 56	4	27
Education	Secondary school	2	13
	University	0	0
	Others	10	67
	None	3	20
Occupation	Retired / Unemployed	7	47
	Employed	6	40
	Private business	2	13
Income per month	less than 100TJS	0	0
	from 100 to 200TJS	6	40
	from 200 to 300TJS	5	34
	from 300 to 400TJS	1	6
	more than 400TJS	3	20

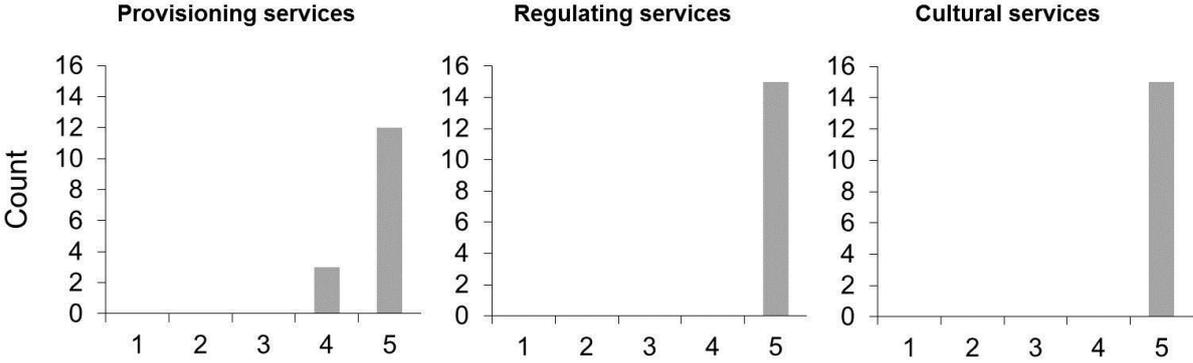
4.6.2 Benefit expectations of the tenants

It is of certain interest to compare the ‘benefit expectations’ of the tenants in *Vuzh* with the respective data on the overall level of the three researched villages (N=50). Generally, benefits, i.e. ES (see 3.5) from the forest plots rehabilitated under SBA are very important to all tenants. At the same time, all tenants are quite optimistic to receive the first respective benefits in the time frame of SBA (see Fig. 34).

Using the factor analysis (see 3.5), the evaluated ES were analyzed in order to determine if they would group in the same way in *Vuzh* (N=15) as they did for the other three researched villages (N=50). The result shows that all different ES are so highly correlated to each other, that it seems impossible to extract several factors, i.e. there was only one factor extracted.

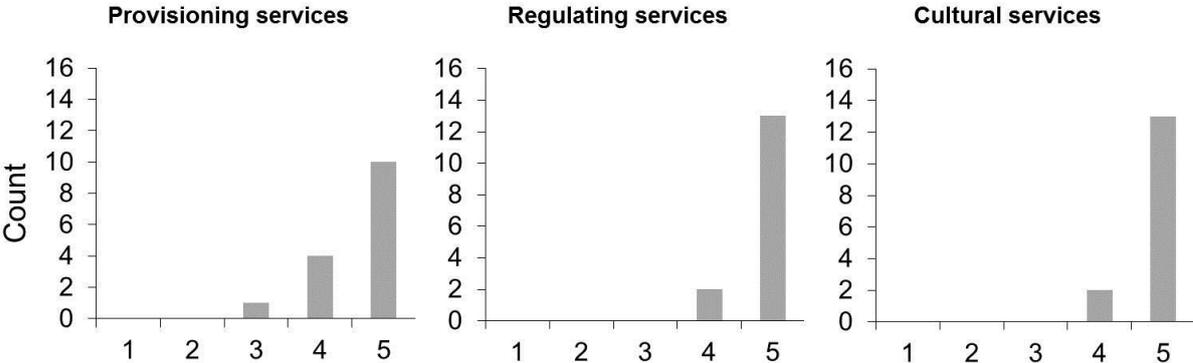
However, based on the raw data from the interviews in *Vuzh* the average values (see footnote 52) for provisioning services, regulating services and cultural services were extracted in order to present the importance and expected ES graphically. The ‘benefit expectations’ of the tenants in *Vuzh* show interesting similarities with the respective findings on the ‘willing’ in *Chilizat*, *Imam* and *Sadvadg*

villages (compare Fig. 29 and Fig. 33, Fig. 30 and Fig. 34). Ecosystem services are of similarly high importance for the ‘willing’ to enroll in SBA and actual tenants of the pilot plot in *Vuzh*.



Scale: 1-very unimportant; 2- unimportant; 3- neither important nor unimportant; 4- important; 5- very important

Fig. 33: Perceived importance of Ecosystem Services in Vuzh, N=15.



Scale: 1- very unlikely; 2- unlikely; 3- don't know; 4- likely; 5- very likely

Fig. 34: Expectations on Ecosystem Services in the time frame of the Saving Book Approach in Vuzh, N=15.

4.6.3 Implementation phase and lessons learned so far

In comparison to the three studied villages, different questions were asked in *Vuzh* as SBA implementation has already started here (see 3.2). The purpose was to gain information on the main lessons learned from the implementation process (see 2).

According to the tenants, the *Vuzh* plot has been divided amongst them based on a joint decision making process of *Leskhoz* and all tenants. The process has been facilitated by the GIZ. The 20 hectares area was divided into 20 plots of 1hectare each, being cautious that the average soil characteristics are the same in each of the plots⁵³. The division was conducted in a way that each small plot consists of both parts sandy and stony and thus preventing conflicts between the tenants. Once the division scheme was agreed upon, the tenants decided who would get which plot. To guarantee a fair process, the plots were given according to alphabetic order of the surnames of the tenants. Some tenants received 2 hectares as the size of the plot is 20 hectares, and there were 15 tenants. This described plot division method was very well accepted by all tenants and seems very promising for avoiding conflicts in further SBA implementation. The survey results show that no tenants faced severe practical problems with SBA implementation in the village. The

⁵³ The parts closer to the river are rather sandy, whereas the upper part of the *Vuzh* plot is more stony.

work⁵⁴ was organized jointly by the *Leskhoz* and GIZ as well as the tenants. So far, no conflicts among tenants occurred with regards to the management of the plot. Until recently, also no problems were mentioned between tenants and village inhabitants, who are not involved in forestry but use the water of the same channel to irrigate their farmland. This can be considered as an ideal situation. However, it is by far not definite that the situation will be similar in the other three villages if SBA will be implemented there.

According to the survey results, only 2 tenants of the 15 disagreed with the time frame of SBA. One of them suggested that it should be from 6 years to 9 years and the other suggested that it should be from 9 to 12 years. The reason given for their disagreement was that 6 years of SBA are not long enough to benefit from reforestation, taking into account *Vuzh*'s climatic conditions.

Concerning the payment, only three tenants disagreed with the proposed amount of 500euro/per hectare/6 years under SBA. Two of them suggested that it should be around 750EUR per hectare in 6 years and one said it should be 900EUR per hectare in 6 years. The reason given for their disagreement was that the workload under SBA was too high in relation to the payment. However, these tenants did not state that they would leave the program.

4.7 Overview on the results

4.7.1 Overview on the survey results

Overall data level (N=50)

The aim of this research is to determine the influential factors on local peoples' WTE in SBA on the village level. However, also the overall data was analyzed in order to obtain a general picture of WTE in SBA. For the overall data level the following can be summarized:

The regression analysis (see 3.5) shows that 'ability' is the only factor that explained interviewees WTE in SBA. This means that in order to be willing to enroll in an SBA labor force, time availability as well as physical ability are the main preconditions. This was as well confirmed by examining the differences between the median values of those who were willing to enroll and those who were not, using the Mann-Whitney U and Wilcoxon W tests. Demographic and socio-economic factors were included in this test, as well. 'Age' was revealed to be an influential factor. The tests suggested that WTE is only given, if 'age' of the respondent is under 46. However, this is in contradiction to the findings in *Vuzh* village, where SBA is currently being implemented (see 5.1.5).

Although on the overall data level no 'benefit expectations', i.e. ES of the forest, are revealed to be an influential factor, all evaluated ES could be aggregated very well according to the MA classification (see 1.1.2 and 4.2.2). The data suggests that ES have a high importance to all interviewees no matter if it the discussion was hypothetical as in *Chilizat*, *Imam* and *Sadvadg* villages or real, as in *Vuzh* village. The vast majority of interviewees were convinced that the evaluated ES could be provided by the forest plot within the time frame of SBA.

⁵⁴ Rehabilitation of the irrigation channel, fencing the whole plot and planting one third of the plot.

‘Social pressure’ from family members, neighbours, *Leskhoz* supported by GIZ and VO were revealed not to be influential factors for the decision to be ‘willing’ or ‘unwilling’. The importance of SBA implementation to different groups of people and their influence on the interviewees decision seems to have same pattern for all interviewees, thus these two aspects show good aggregation.

Individual village level

As the results of the Mann-Whitney U and Wilcoxon W tests show on the individual village level, out of ‘benefit expectations’, ‘social pressure’, ‘ability’, ‘age’ and ‘income’ only ‘ability’ was a significant predictor of WTE in the three villages. None of the demographic and socio-economic factors influenced WTE in SBA. Fig. 35 summarizes all factors, which were included in the Mann-Whitney U and Wilcoxon W tests on the village level. When referring to the research question “Which factors on the village level influence local people’s Willingness to Enroll in Saving Book Approach most?” the results of the study give the clear answer that the most influencing factor is the ‘ability’, a household has. ‘Ability’ comprises labor force, time availability and physical ability of each interviewee. A significant difference between the ‘willing’ to enroll and the ‘unwilling’ interviewees is determined by their stated ‘ability’. Consequently the null hypothesis, which states that there is no difference on the village level between those ‘willing’ to enroll and the ‘unwilling’ can be rejected. The results show that on the individual village level those willing to enroll differ from those with regards to their ‘ability’ (*Imam* village $p < .01$, *Sadvadg* village $p < .01$ and *Chilizat* village $p < .001$). Thus the alternate hypothesis is true, which states that there is one or more factors influencing the WTE (see 2.3).

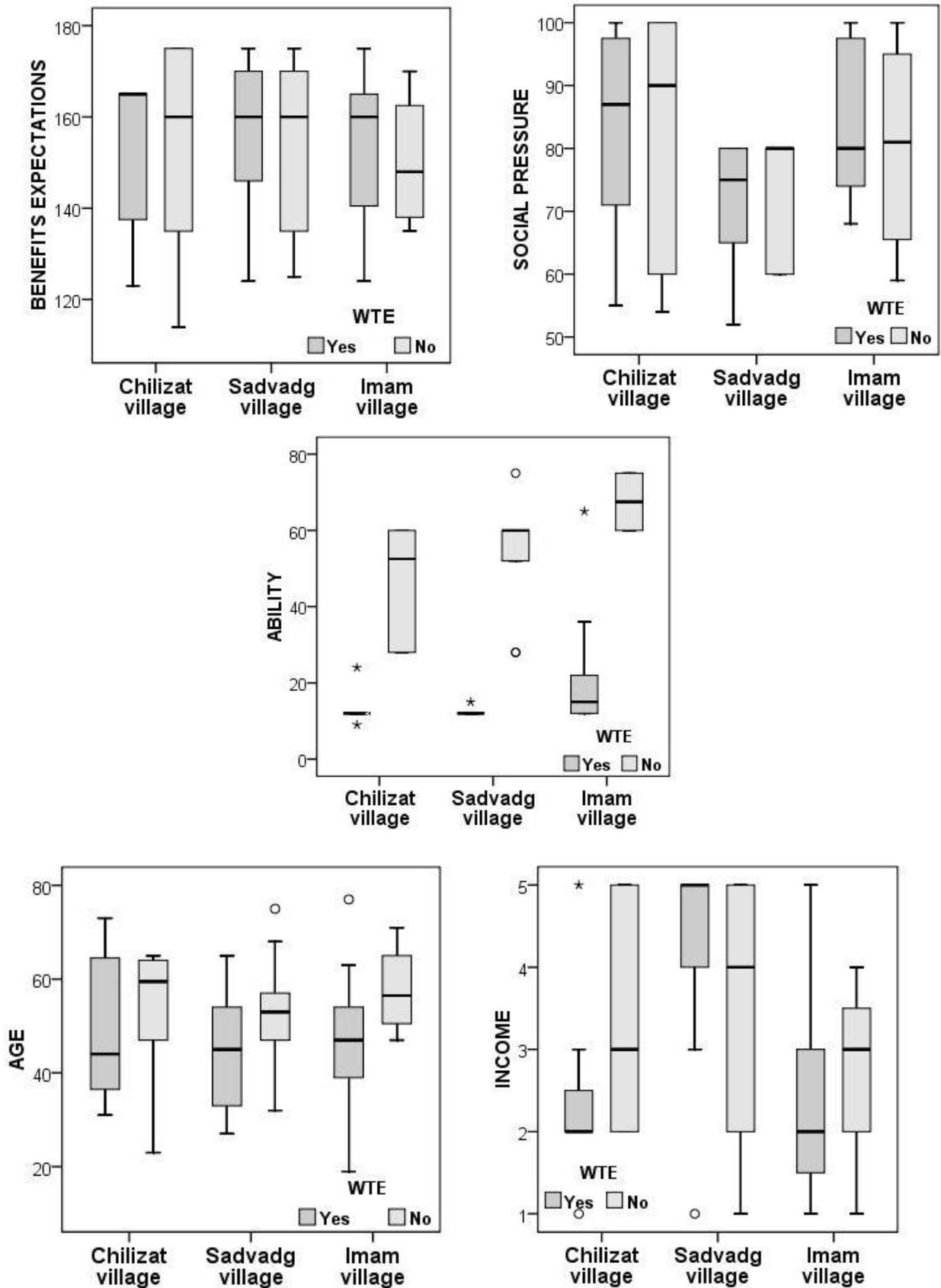


Fig. 35: Benefit expectations, social pressure, ability, age, income and Willingness to Enroll on the village level. Ability factor: Imam village $p < .01$, Sadvadg village $p < .01$ and Chilizat village $p < .001$

4.7.2 Overview on the cost estimation results

Comparison of cost estimations in the three researched villages

The cost estimations showed that costs differ (see 3.5), depending on the size of the plot, condition of irrigation system, availability of fencing and planting material and transportation distance. SBA implementation in the *Sadvadg* village has the lowest cost followed by *Varkhedz* plot and *Shendod* with the highest costs. Table 21 represents the summary of the cost estimation of all plots. The data suggest that the rehabilitation of the smallest plot would cause the highest costs and the biggest plot the lowest costs per hectare. The reasons for this are:

- For the reforestation of *Shendod* plot, the main channel of 3250m length needs to be rehabilitated which requires a lot of labor force. At the same time, the planting and fencing material need to be transported quite far (30km), which is costly (see 4.3.2).
- In contrast, on the *Sadvadg* plot the main channel rehabilitation, where labor force is required is only necessary for a 380m part. The required planting and fencing material does not cause any transportation costs, as they can be obtained from the more vegetated area of the plot (see 4.5.2).
- The *Varkhedz* plot is relatively similar to *Sadvadg* plot in terms of total costs per hectare. The fencing and planting material need to be transported which causes the highest cost. However, the channel rehabilitation hardly requires any labor force and consequently does not cause high costs (see 4.4.2).

		Total (TJS)	Total (EUR)	Per ha (TJS)	Per ha (EUR)
Shendod plot (6.6 ha)	Fencing	14,306	2,148	2,168	325
	Channel rehabilitation	50,488	7,581	7,650	1,149
	Planting	743	111	113	17
	Total	65,537	9,840	9,931	1,491
Varkhedz plot (19 ha)	Fencing	20,152	3,026	1,061	159
	Channel rehabilitation	5,506	827	290	44
	Planting	1,952	294	103	15
	Total	27,610	4,147	1,454	218
Sadvadg plot (25ha)	Fencing	11,752	1,765	470	71
	Channel rehabilitation	16,625	2,496	665	100
	Planting	1397	210	56	8
	Total	29,774	4,471	1,191	179

Estimated costs and actual costs in the implementation phase in Vuzh

A comparison of planned costs and actual costs in *Vuzh* under SBA implementation helps to determine if the theoretical cost estimations fit to reality. Prior to SBA implementation, the costs for fencing, channel rehabilitation and planting had been estimated in *Vuzh*. The implementation phase showed that the

estimated costs did not differ from the actual costs significantly -the residual was around 2,500TJS equivalent to 380EUR. The lessons learned in *Vuzh* with regards to costs before and after the implementation of SBA helped to make calculations more accurate for the three researched plots. Consequently it can be expected that in the three researched villages the difference between the planned and actual costs will not be large.

4.7.3 Plot suitability versus Willingness to Enroll

Based on the survey on WTE of people in the villages and investment cost estimations of the plots, the studied plots vs. studied villages can be summarized as follow (see Table 22):

- The size of the *Shendod* plot is relatively small and the total costs per hectare for fencing, rehabilitation of the channel and planting material provision costs are the highest. If looking at the WTE of the local people in *Chilizat* village 54% of the surveyed people were willing to enroll and 46% were not.
- In contrast the *Sadvadg* plot has the biggest size and the lowest cost per hectare for fencing material, rehabilitation of the channel and planting material provision. 50% of the surveyed people in *Sadvadg* village were willing to enroll and 50% were not.
- The *Varkhedz* plot, with regard to its size, ranges between the *Shendod* and *Sadvadg* plots. The costs per hectare do not differ much from *Sadvadg* plot, but in contrast to *Sadvadg*, 79% of the surveyed people were willing to enroll and only 21% were not.

Table 22: Plot suitability versus Willingness to Enroll.

Plot/village	Size of the plot (ha)	Cost per ha (TJS)	Cost per ha (EUR)	Households in the village	Surveyed households	Willing to Enroll (N)	Willing to Enroll (%)
Shendod / Chilizat	6,6	9,373	1,407	19	13	7	54
Varkhedz / Imam	19	1,308	196	42	19	15	79
Sadvadg / Sadvadg	25	791	119	23	18	9	50

5 Discussion

5.1 Influence of different factors on Willingness to Enroll

5.1.1 Benefit expectations and Willingness to Enroll

The perceived ‘benefit expectations’ (see 3.2) appeared not to play a significant role for WTE in SBA (see 4.2.2). Neither the overall data level (N=50) nor the individual village level the persons ‘willing’ and ‘unwilling’ to enroll in SBA differed from each other with regards to their ‘benefit expectations’. When looking at the ‘benefit expectations’ of the ES in *Vuzh* village, it becomes clear that interviewees attribute the same importance and expectations to the ES (see 4.6). Reasons for the equal ‘benefit expectations’ in all villages can be explained, as with the current problems of the forest management in Gorno-Badakhshan (see 2.1):

- The shortage of pasture areas forces all households to bring their livestock to the forest areas for grazing. This is especially crucial during spring time, when there usually is a lack of fodder (see 2.1). This feature is typical for all villages, interviewed during the study. Even more importantly, the energy crisis in rural villages, which emerged after the independence of Tajikistan, created a high dependency on fuel wood for cooking and heating during the up to seven months with cold temperatures (see 3.6). This dependence on forest resources was evident during the interviews in all studied villages (see 4.2.2). Consequently almost all interviewees - the ‘willing’ and the ‘unwilling’ - perceived forests as an important source of fodder for livestock and fuel wood over the long term. To which extent the villagers would use the resources in a sustainable way⁵⁵, depends on their sense of ownership towards their forests. JFM and SBA allow for the local people to generate such an ownership perspective (see 1.3.3).
- Each interviewee – regardless whether – ‘willing’ or ‘unwilling’ demonstrated high concern about water regulation and erosion control functions of forests as well as the aesthetic and recreational values of it.

Even splitting the ‘benefit expectations’ factor into the three groups: provisioning services, regulating services and cultural services, does not show any significant difference between the ‘willing’ and ‘unwilling’ persons (see 4.2.2). It should be noted that the ES classification, according to the MA, fit very well, also in the context of the remote villages in the Tajik Pamirs (see 1.1.2).

Although in this thesis ‘benefit expectations’ turned out not to be an influential factor on WTE, similar studies have shown that people who perceive receiving benefits from any conservation programs are more likely to express positive attitudes (Jackson et al., 2003; Fielding et al., 2005; Dolisca et al., 2006; Zhang et al., 2011). Zhang et al. (2011) analyze factors influencing farmers’ Willingness to Participate (WTP) in the conversion of cultivated land to wetland program in China and defines ‘benefit expectations’ or

⁵⁵ It is recommended by the Leskhoz and GIZ to take out the fodder from the forest and bring it to the livestock and not the other way around. According to the sustainability principle, the harvested amount of fuel must not exceed the increment on the plot.

perceived benefits in a very broad sense. They concluded that perceived benefits were closely associated with WTP. Surveyed persons who thought that wetlands could provide more benefits to them were more willing to participate in the program. The contrast to the results of the current study can be explained by the direct and strong dependence of almost all rural people in the Tajik Pamirs on their ecosystems and respective services. In the investigated villages, no division of the population into more or less dependent people was observed (see 4.2.2).

5.1.2 Social pressure and Willingness to Enroll

Different groups of people who could influence the interviewees' decision on enrollment in SBA make up the 'social pressure' factor (see 3.2). This factor does not have any influence on the WTE on overall data level as well as on individual village level (see 4). To put it differently, it means that all people interviewed considered their social environment in the same manner. In the cultural context of the study region (see 1.2.4), where social relationships between different groups of people are very strong, it is not surprising that the 'willing' and the 'unwilling' to enroll felt the same influence by their social environment. It is worthwhile to mention that family members and the Village Organizations (VO) seem to have more influence on the decision-making of the interviewee than neighbours and *Leskhoz* supported by GIZ. Similarly, Poppenborg and Koellner (submitted) show in their research South Korea, that household members influence farmers' land use decision-making the most. However, on the individual village level during the interview it seemed that, some individuals by no means perceived the opinion of their neighbors about them as 'social pressure'. These rare cases can be considered as statistical outliers of individuals, not typical for the cultural context in the Tajik Pamirs.

5.1.3 Ability and Willingness to Enroll

The 'ability' factor was a highly significant predictor of WTE in SBA for the overall data, as well as on the individual village level (see 4.2.4, 4.3.1, 4.4.1, and 4.5.1). This underlines that local people's willingness or unwillingness to enroll in SBA is very much dependent on the 'ability' of the household members to work, which includes time availability, physical ability and availability of labor force.

Although the content of the information workshops on SBA (see 3.3) in all studied villages was intentionally kept hypothetical⁵⁶, local people were fully aware of the workload they would have to face, if they would enroll in SBA, in case it were implemented in their villages (see 3.3.2). A similar study by Zhang et al. (2011) confirms that 'ability' plays a crucial role in the decision making process in any conservation program, based on local populations physical labor.

The results of the current study show that 'ability' seems to be a precondition for a household to enroll in SBA. The WTE of a household is highly dependent on this factor. However, WTE is the intention and has to be distinguished from the actual behavior (see 3.2) of the household when it comes to the implementation of SBA. A household, which has the 'ability' to be enrolled, will not necessarily fulfill all

⁵⁶It is uncertain when SBA will be implemented in these villages.

the required workload under SBA. Within the framework of the current study, it was not possible to determine such features, as the real implementation of SBA would be a precondition to do so.

The results from *Vuzh* village, where a real implementation of SBA has already begun, underline that ‘ability’ is the key factor for managing the required workload. Up to now, all tenants already enrolled in SBA have been managing well with the workload, as demanded by *Leskhoz* and GIZ, which means that they also have the ‘ability’ to do so (see 4.6). However, at present this information should be interpreted with caution. The implementation of SBA only began at the beginning of 2011 in *Vuzh*. There are still years to come before final conclusions can be drawn.

5.1.4 Gender and Willingness to Enroll

From a human ecology point of view, Dickinson et al. (2006) have shown that personal characteristics, such as gender have a considerable influence on the behavior of respondents. However, the overall data (see 3.5) of this thesis suggests that ‘gender’ does not have an influence on WTE on the overall data (see 4.2.6). Males and females showed to be equally ‘willing’ or ‘unwilling’ to enroll in SBA. This a quite surprising result, as the cultural background of the people in the Tajik Pamirs subscribes forestry jobs rather to men than to woman (see 1.2.4). There may be different reasons for this finding. First, the method of selection of interviewees was not specifically sensitized to the gender question. For practical reasons, it could not be influenced, who, men or women would come to the information workshop and consequently become an interviewee (see 3.3.2)? It is possible that women only joined the workshop because it was more feasible for them to represent the household at this occasion; as a delegate of the men so to say. Another reason might also lie in the hypothetical design of the interviews (see 3.3.2), which was then hypothetically answered by any representative of the household, man or woman. In the case of an actual implementation of SBA, one can assume that more men and fewer women would take part in enrollment. This fact is confirmed by the findings in *Vuzh*, where SBA is actually being implemented. Here, all tenants are males (see 4.6.1). It is quite likely that in the *Imam* and *Chilizat* villages the same would happen, when an SBA project would become real (see 4.1.1). One should consider that females who were willing to enroll in SBA in the *Imam* and *Chilizat* villages have a male labor force in their households (e.g. husband, son) who can likely fulfill the workload. It can be assumed, but needs to be further investigated, that the decision to enroll or not to enroll is mainly made in the family, whereas the final decision of enrollment will be made by the men rather than by the women.

5.1.5 Age and Willingness to Enroll

When analyzing the overall data (N=50), ‘age’ revealed to be the only factor of the demographic and socio-economic situation, related to the WTE in SBA. The median of ‘age’ of the ‘willing’ to enroll people was 46 years whereas the median ‘age’ of the ‘unwilling’ was 54 years (see 4.2.5). A possible interpretation for this finding is that older people felt that they would not be able to carry the workload of SBA and thus decided not to enroll in SBA. All interviewed persons possess farmland, the size of which varied from village to village (see 3.6). During the interviews, elderly people stated difficulties even in managing their farmland. Additionally, to take responsibility for 1 or 2ha of a forest plot seemed too

difficult for them. They were worried that they did not have the capacity to manage both farm and forest land. The older farmers regard their farmland as the most basic source of sustenance for their families, thus a shift to forestry does not seem to be a realistic livelihood strategy for them.

However, if looking at *Vuzh* village with regards to ‘age’, out of 15 tenants 8 are older than 46 years old. This suggests that some more flexibility in the interpretation of the results on the overall data level should be allowed. It seems reasonable to argue that ‘age’ can be seen as a selection criterium for a tenant, but ‘age’ limits should not be counted as a threshold to include or exclude him/her in SBA.

In contrast to the results of the overall data on the individual village levels, no relation of ‘age’ and WTE could be found (see 4.2.4, 4.3.1, 4.4.1 and 4.5.1). Nevertheless, the general tendency of the finding of the overall data level (N=50), that ‘age’ has a significant influence on WTE goes along with the findings of several similar studies. Zhang et al. (2011) also indicate in their study that the older farmers were less likely to participate in shifting one land use with another due to the lack of labor force in their families or were simply not willing to shift their land use types. Support of this an explanation from another perspective was given by Dolisca et al. (2006) in relation to forestry management. They conclude that “older persons were mainly interested in collecting forest resources, while young people were willing to participate in and contribute to the process of decision making affecting forestry programs”. This might be an important point also in the Tajik Pamirs. It is possible that the perspective of being able to harvest the fruits of the long time investment in forest stimulates younger people to enroll in SBA more than old people.

5.1.6 Income and Willingness to Enroll

Ma et al. (2009) and Zhang et al. (2010) conclude that income is one of the most important predictors of WTP or WTE in forestry management programs. They indicate that low income respondents were more likely to participate in the reforestation program, as they perceived that the payment represents an additional source of income. In contrast to these findings, Doliska et al. (2006) and Liu et al. (2010) concluded that better-off families are more likely to participate in a reforestation program, since “richer farmers are acutely aware of the fatal consequences of deforestation”. Both points of view are very reasonable. However, in this thesis neither on the overall data level (N=50) nor on the individual village level ‘income’ played an important role (see 4.2.5, see 4.2.4, 4.3.1, 4.4.1 and 4.5.1). There was an evident gap between those whose ‘income’ is relatively high and whose ‘income’ is relatively low on the overall data level. However, if considering comparatively low and high ‘income’ persons, there was no relationship with WTE. This means that those who stated to have a relatively high or low ‘income’ were not the same who were ‘willing’ and ‘unwilling’ to enroll in SBA. What does this finding mean for the payment people receive for their enrollment in SBA? In *Vuzh* for example, where the payment has already started, tenants receive 46TJS (7EUR) per month/per hectare over a time frame of 6 years (see 1.3.3). For the poorest families, earning less than 100TJS cash per month enrolling in SBA with 1 or 2 ha can result in a relatively significant increase of their monthly ‘income’. The low ‘income’ though, is mostly associated to other deficits of assets of the household, so that many of the poor households do not have

the required ‘ability’ to manage additional forest plots. For better off people the payment offered by SBA is not very attractive. They likely have the opportunity to earn more money if they use their time for other activities. Therefore, it can be concluded that payment under SBA is rather a moral incentive for better-off households, which shows the seriousness of the approach proposed by *Leskhoz* and GIZ to the local people. However the decision to enroll or not, seems rather to be connected to the long term perspective and the benefits (harvest) to be expected from the plot after SBA is turned in a normal JFM system.

5.2 Methodological aspects

5.2.1 Applicability of the methodology

In general the used methodology was appropriate to answer the research questions (see 2.3). All statistical methods to test the hypothesis were precise for small size samples and delivered the required results (see 4). Nevertheless, there are some conceptual and methodological aspects as well as practical lessons learned which are worth considering for future research activities on related topics in the Tajik Pamirs:

- The issue of sample size for statistical analysis (see 5.2.2).
- The questionnaire improvements and enhancement of responses (see 5.2.3).
- The season to conduct a survey (see 5.2.4).

5.2.2 Sample size and sample selection

Undoubtedly, the low number of interviewed persons on the individual village level is the most problematic point of this study. Even if in each studied village more than 68% of the total number of households were interviewed (see 3.3.2), still it was evidently not sufficient data to run more advanced statistical analysis on the village level, such as to determine the influential factors on the WTE. Due to the lack of cases, ‘education’ and ‘occupation’ factors dropped out of the analysis even on the overall data level. When considering the village level, ‘gender’, ‘education’ and ‘occupation’ were eliminated from the analysis for the same reason. Due to the low number of cases, it was only possible to apply the TPB model to the overall data (see 3.5). Taking into consideration the average size of the villages in the Tajik Pamirs (about 10 to 50 households) it seems very challenging or even impossible to tackle and solve this problem if doing research on the village level. It is possible to cover more villages thus increasing the overall number of cases, but as it was shown the overall data representation in some cases contradict one another when considering the individual village level (see 4). Even given the small sample size on the village level, the results certainly represent the individually studied villages and give interesting insights on the influential factors on WTE.

5.2.3 Questionnaire elaboration

With regards to the questionnaire (see Appendix 1), the order of some questions, which potentially could have the same answer can be changed thus improving the quality of the responses. For instance, the order of the evaluated ES questions could be improved. Apart from this, more qualitative questions can be added in order to find out the probable hidden motivations and interests of local people. For example further questions on the ‘social pressure’ factor can be asked in order to weight the importance of the

opinion of different groups of people i.e. ‘is your neighbor’s opinion more important to you or your household, why?’ and so forth.

Furthermore, the wording of the questionnaire needs to be more simplified, especially when it comes to the use of different languages. In some cases, it was difficult to find the proper Russian, Tajik or Shugni translation for specific English words, therefore some meaning may have been lost in translation.

It should be noted, that it was very advantageous that no interpreter was needed, so there was no lost information as it typically happens if the researcher does not speak the local languages.

5.2.4 Time for conducting survey

The survey should be conducted in either winter or in late summer. Due to the limited period of this research, the interviews were conducted in April, May and June. In this period, it seemed difficult to gather all villagers for the SBA information workshop and correspondingly for the survey, as they were occupied with their farmland or had already moved to the mountains with their livestock.

5.3 Limitations of the study

Comparing the ideal situation in *Vuzh* plot/village with the *Shendod/Chilizat* plot/village, *Varkhedz/Imam* plot/village and *Sadvadg* plot/village it is challenging to predict that in these three plots/villages the implementation of SBA will be as successful as in *Vuzh*. Although a precise hypothetical survey and actual cost estimation were conducted in these villages, the real implementation of SBA may face unpredictable challenges. For example due to inflation it might be that the costs estimations for each plot should be revised. As well it might happen that by the time SBA is implemented in these villages, many interviewees would already have left to Russia or some people who did not participate in the survey would come back to their villages, as an effect of migration. The fluctuation in migration should be taken into account. Moreover, if looking at the percentages of the interviewed households in each village (see 3.3), they do not cover the whole village. There were households, which were not able to participate in the information workshop for various reasons. However, this does not mean that these households can automatically be considered as unwilling to enroll.

6 Conclusion and recommendations

6.1 Saving Book Approach implementation in the studied plots and villages

6.1.1 Priority plot and village for the Saving Book Approach

The results suggest that two questions have to be answered simultaneously for a successful implementation of SBA.

- Is the plot suitable in a financial sense, i.e. is the investment cost per hectare ratio feasible?
- Are local people willing to enroll?

These two requirements not necessarily match together. Considering the three studied plots and villages, they were weighted to determine the plot/village with highest probability for successful implementation of SBA. Based on the results (see 4.7.3) respective conclusions were drawn:

Shendod plot, with its 6.6 ha is the smallest in terms of area and at the same time with highest costs per hectare for the reforestation process under SBA. It should be questioned if it would be efficient to invest a comparatively high amount of money in a relatively small plot? When looking at the WTE of local people in SBA approach, 7 interviewed persons stated their WTE in SBA was implemented here, which means that from the WTE point of view the number of persons willing to enroll is sufficient. To each of the 'willing' a plot of approximately 1 hectare could be leased. A critical factor on *Shendod* plot is that the channel from which the plot is projected to be irrigated would be the same, from which local people irrigate their farm land. This brings up a certain conflict potential on water distribution between future tenants and other local people, not becoming SBA tenants. In *Vuzh*, though tenants and non-tenants share the same channel for irrigation of farm and forest land and no conflict occurred so far. However, it is hardly possible to assume that the developments would definitely follow this pattern on *Shendod* plot and *Chilizat* village.

Sadvadg, with its area of 25ha the biggest plot was estimated to generate the lowest cost per hectare, seems the most suitable plot for SBA implementation in terms of investment costs and area rehabilitated. With regards to the availability of irrigation water on the plot the situation on the *Sadvadg* plot seems uncomplicated since no other land users have stakes in the projected water supply system. However, when looking at the WTE of the local people a critical point becomes evident. Only 9 persons stated to be willing to enroll in SBA, if it would be implemented in their village/plot. The average plot size per tenant would be 2.8 hectares. It can be doubted if this would be a manageable size for each SBA tenant.

The calculated investment costs per hectare for the 19ha of *Varkhedz* plot are slightly higher than in *Sadvadg* plot. Concerning the costs per hectare ratio, it seems reasonable to implement SBA here. With relatively low investments, a comparatively large area can be reforested. Even more important is the relative high number of 'willing' to enroll. If considering the proportion between the number 15 'willing' to enroll and the size of the plot, a realistic average of 1.3 hectare per SBA tenant comes out. The respective workload per tenant seems manageable. Based on the above considerations it is recommended to give priority to a SBA implementation in *Imam* village/*Varkhedz* plot.

6.1.2 Recommendations before starting the implementation of the Saving Book Approach

In correspondence to the fact, that it is still uncertain whether and when an implementation of SBA would be realistic, it is recommend to consider some important aspects in respect to the given priority to *Imam* village and *Varkhedz* plot.

Migration

By the time SBA will be possible to be implemented in this village some persons who took part in the survey might happen to have migrated and others who did not take part in the survey might have come back to the village. When it comes to the real implementation of SBA, it is recommended that *Leskhoz* would contact the VO head of the village to analyze how many persons left the village and how many came back.

Participation in the survey

The 55% of the households, which did not take part in the survey, should not be excluded, when a real implementation phase would start. It is recommended that *Leskhoz* and GIZ would gather these households in a workshop and inform them about SBA conditions and its implementation. This would reduce conflict potential about the enrollment in SBA among people in the village.

Inflation

The costs for diesel fuel and other necessary inputs for the reforestation of the plot might be significantly higher by the time, SBA will be possible to be implemented. It is recommended that all relevant material and transportation calculations need to be updated with the actual prices.

6.2 Criteria for Saving Book Approach implementation beyond the studied plots and villages

The current study aimed to gain a basic understanding on factors, which influence WTE in SBA of local peoples in three villages in Gorno Badakhshan (see 2.3). Out of several analyzed factors, the ‘ability’ that each household has revealed to be the most influencing one (see 4.2 and 5.1.3). This finding is of fundamental importance when starting a broad implementation of SBA in other villages in Gorno Badakhshan and beyond its borders. ‘Ability’ can be seen as a necessary precondition for the success of SBA implementation. However, possessing ‘ability’ does not necessarily mean that households would actually fulfill all demanded workload under SBA. This will be visible only when SBA will be actually implemented. Based on the village level results criteria were derived, which potential can serve as guidelines to evaluate a household (see Table 23), a plot (see Table 24) and a village (see Table 25) for their appropriateness for practical SBA implementation in Gorno Badakhshan.

Table 23: Household assessment for a dissemination of the Saving Book Approach based on the ability of the household

Criteria and indicators	Note	Methods
<p><i>Labor availability:</i></p> <ul style="list-style-type: none"> • Is there at least one person in the household can be counted as full labor force? • Is there a replacement for him/her to fulfill the workload in case if he/she would leave the village in the time frame of SBA? 	<p>Due to the high migration rate, it is difficult to predict whether a person, counted as labor force would stay in the village during the 6 years of SBA. Here the age has to be considered most. Young people travel very often to other part of the country or abroad, seeking jobs. It is important to determine the mid-term plans of him/her, taking into account the time frame of SBA. It has to be made sure that even if the person leaves the village in the time frame of SBA, there would be a replacement for him/her to fulfill the workload. Gender issues needs to be considered. In the end, the decision of enrollment has to be made by the person who will work in the forest.</p>	<p>Conducting information workshops, explaining JFM and SBA, where each household of a village is represented</p> <p>Conducting a questionnaire based survey on household level, ideally with the head of the household who makes decisions</p>
<p><i>Time availability:</i></p> <ul style="list-style-type: none"> • What is his/her occupation? Does the household cultivate farmland? How many hectares? • Does the potential tenant believe that he/she had the time to fulfill the workload under SBA? 	<p>High attention needs to be paid to the actual occupation of the labor force as well as the size of farmland, which the household cultivates. In spring, when there is high season for fieldwork it is difficult to simultaneously work in a job, to work on the farmland and to take responsibility of one or two ha of forest at the same time.</p>	<p>Collaboration with VO and local representatives of Leskhoz collecting more information about the ability of those households which are willing to enroll</p> <p>Providing a transparent process and being open with the concerns about ability</p>
<p><i>Physical ability:</i></p> <ul style="list-style-type: none"> • Does he/she believe that he/she would be physically able to fulfill the workload under SBA? 	<p>Age and sex of the labor force need to be considered. In some cases, e.g. ambitious and highly motivated 'willing' persons older than 70 years, intend to get who enrolled in SBA. However, from the physical ability point of view these persons might not be able to fulfill the workload under SBA, especially with respect to 6 year perspective of the approach.</p>	<p>Personal observation of physical ability of the available labor force</p>

Table 24: Plot assessment for a dissemination of the Saving Book Approach based on cost estimations.

Criteria and indicators	Note	Methods
<p><i>Size and soil texture:</i></p> <ul style="list-style-type: none"> What is the size and the soil texture of the plot? 	The soil is usually sandy or gravel, stony or silt, clay or mixture of these	GIS and ground truthing data collection
<p><i>Fencing:</i></p> <ul style="list-style-type: none"> How far from the SBA plot, the required volume of fencing material is available? 	It is necessary to determine the plot where the fencing material can be obtained from. The distance to the plot and the volume of the fencing and planting material plays an important role for investment costs.	Technical projections and calculations according to material, labor and transportation costs.
<p><i>Availability of water:</i></p> <ul style="list-style-type: none"> Which technical solutions are feasible for the water supply of the plot? How much would they cost? 	For the rehabilitation of the irrigation system, it is important to find a person in Leskhoz or in the village who knows, how the irrigation system worked in the 1990s. In some cases old maps are available. As a rule, it can be assumed that a sustainable rehabilitation of the irrigation system requires the highest investments. However sometimes cheap and intelligent solutions can be found.	Interviews with local experts
<p><i>Provision of planting material:</i></p> <ul style="list-style-type: none"> How far from the SBA plot the required volume of planting material is available? 	It is necessary to determine the plot where the planting material can be obtained from? The distance to the plot and the volume of the fencing and planting material plays an important role for investment costs	

Table 25: Village assessment for the dissemination of the Saving Book Approach based on number of households willing to enroll and the size of the plot.

Criterion and indicators	Note	Methods
<p><i>WTE in relation to plot size:</i></p> <ul style="list-style-type: none"> What is the number of households, 'willing' to enroll in SBA? What is the size of the plot? 	<p>In some cases the number of households, which are willing to enroll, is too low, thus, the share of the plot per households would be relatively high. The opposite situation is also imaginable.</p> <p>In the first case it must be well examined which size of a plot can be actually managed by a potential tenant? In the extreme case, not the whole plot should be reforested under SBA, but it should be started with manageable parts of it. In the second case, a transparent selection process must be initiated in order to prevent conflicts between those, who would actually get a SBA lease contract and those who would not.</p>	<p>Conducting a questionnaire based survey on household level, ideally with the head of the household who makes decisions</p> <p>GIS and ground truthing data collection</p>

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8 Appendices

Appendix 1

The questionnaire used during the fieldwork:

Date: _____ / Duration _____ min/ Village: _____ / District _____ / Interviewee #: _____

1) Willingness to Enroll in SBA

	Question	Answer	Code
1.	How long do you live here (sense of place)?	open answer	no coding
2.	Can you share some experience or memories on forestry in the village before and after the breakdown of the Soviet Union?	open answer	no coding
3.	Are forests important to you (generally) in a sense of their benefits for your daily life?	Very unimportant Unimportant Neither important or unimportant Important Very important	1 to 5
4.	Why?	open answer	1 to n
5.	Do you perceive a deserted plot next to your village as a problem?	open answer	no coding
6.	How would you tackle the deserted plot problem?	open answer	1 to n
7.	What are the reasons of this problem?	open answer	1 to n
8.	Do you have any experience with tenant system?	Yes -> go to Q9 No	1 and 2
9.	Which tenant system?	old tenant system-> go to Q10 JFM -> go to Q10	1 and 2
10.	Since when?	Since	
11.	Knowing the conditions of SBA would you be willing to enroll in the approach if it would be implemented in this village/plot?	Yes No	0 and 1
12.	Why yes/no?	open answer	1 to n

2) Benefit expectations

13. How important to you are each of these expected benefits in 6 years of SBA to you personally?

Benefit	very unimportant	unimportant	Neither important or unimportant	important	very important
Food (i.e. NTFP)	1	2	3	4	5
Fuel wood	1	2	3	4	5
Fodder for livestock	1	2	3	4	5
Water regulation	1	2	3	4	5
Erosion control	1	2	3	4	5
Aesthetic values	1	2	3	4	5
Recreation	1	2	3	4	5

14. In 6 years under SBA this plot is expected to provide some benefits (i.e. services). How likely is it in your opinion for the following benefits:

Benefit	very unlikely	unlikely	don't know	likely	very likely
Food (i.e. NTFP)	1	2	3	4	5
Fuel wood	1	2	3	4	5
Fodder for livestock	1	2	3	4	5
Water regulation	1	2	3	4	5
Erosion control	1	2	3	4	5
Aesthetic values	1	2	3	4	5
Recreation	1	2	3	4	5

	Question	Answer	Code
15.	In 6 years SBA's outcome will create direct financial income for me by selling the NTFP	very unlikely unlikely don't know likely very likely	1 to 5
16.	In 6 years SBA's outcome will creates direct financial income for me by selling the TFP	very unlikely unlikely don't know likely very likely'	1 to 5
17.	How do you see the demand in the market for NTFP in 6 years?	Decrease significantly Decrease a little Don't know Increase a little Increase significantly Stay the same	1 to 6
18.	Why?	open answer	no coding
19.	Who will buy the NTFP?	open answer	no coding
20.	How do you see the demand in the market for wood forest products in 6 years?	Decrease significantly Decrease a little Don't know Increase a little Increase significantly Stay the same	1 to 6
21.	Why?	open answer	no coding
22.	Who will buy the WFP?	open answer	no coding

3) Social pressure

23. Besides your personal opinion, other groups of people might also care whether reforestation is done in your village. Thus, other group of people might appreciate reforestation either very little or very much. If you think about the situation in your village how much is reforestation appreciated by:

Group	very little	little	middle	much	very much
members of your household	1	2	3	4	5
your neighbors	1	2	3	4	5
Leskhoz and the project	1	2	3	4	5
Village Organization	1	2	3	4	5

24. Even though reforestation is appreciated differently by the mentioned groups of people, not all of them might be of the same importance to you. You might either care about their opinion very little or very much. How much do you care about the appreciation to be enrolled in SBA?

Group	very little	little	middle	much	very much
members of your household	1	2	3	4	5
your neighbors	1	2	3	4	5
Leskhoz and the project	1	2	3	4	5
Village Organization	1	2	3	4	5

4) Ability

25. Enrolling in SBA is restricted by several factors. How much are you restricted to enroll in SBA by these factors

Factor	very little	little	moderately	much	very much
availability of labor force	1	2	3	4	5
time availability	1	2	3	4	5
physical ability	1	2	3	4	5

26. You might be prevented from enrolling in SBA by more than one of the mentioned restrictions at the same time. Therefore, you have to choose which one of the restrictions is most important to you.

Factor	very unimportant	unimportant	Neither important or unimportant	important	very important
availability of labor force	1	2	3	4	5
time availability	1	2	3	4	5
physical ability	1	2	3	4	5

5) SBA time frame and implementation

	Question	Answer	Code
27.	Do you agree with the time frame of SBA?	Strongly Disagree -> go to Q28, 29 Disagree -> go to Q28, 29 Undecided Agree Strongly Agree	1 to 5
28.	How long do you think it should be?	Less than 3 years From 3 to 6 years From 6 years to 9 years From 9 to 12 years More than 12 years	1 to 5
29.	Why?	open answer	1 to n
30.	Do you see any practical problems with SBA implementation?	Yes -> go to Q31 No I don't know	1 to 3
31.	What are they?	open answer	1 to n
32.	Would the reforestation (of this particular deserted plot) conflict with other land use types?	Pasture: yes/no/I don't know Agriculture: yes/no/I don't know Construction: yes/no/I don't know	no coding
33.	Who would solve these conflicts?	open answer	no coding
34.	How?	open answer	no coding
35.	Would the irrigation of the plot conflict with other existing irrigated land?	Yes -> go to Q36, 37 No I don't know	1 to 3
36.	Who would solve this conflict?	open answer	no coding
37.	How?	open answer	no coding
38.	What are your expectations from Leskhoz under SBA	open answer	no coding

	implementation?		
39.	What are your concerns with Leskhoz under SBA implementation?	open answer	no coding
40.	What are your expectations from other future tenants under SBA implementation?	open answer	no coding
41.	Is it realistic that all future tenants can work as a collective (e.g. maintaining the channels and fence, and introducing an applicable water distribution scheme)?	open answer	1 to n
42.	What are your expectations from VO's contribution to SBA implementation?	open answer	no coding

6) Demographic and socio-economic factors

	Question	Answer	Code
43.	Gender	Male Female	1 and 2
44.	Age	open answer	1 to n
45.	Highest education	open answer	1 to n
46.	Where do you spend most of your working time?	open answer	1 to n
47.	How much time a week do you spend for this mentioned work	open answer	
48.	What is your approximate monthly household income (in TJS)?	open answer	1 to n
49.	Source of income?	open answer	1 to n
50.	Do you have agricultural field?	Yes -> go to Q51 No -> go to Q54	1 and 2
51.	How big is it?	_____ha	
52.	How many people in your household will be able to fulfill the workload in the forest under SBA and in agriculture at the same time?	_____people -> go to Q53	1 to n
53.	Is it realistic that the available labor force in your family (number of mentioned people) could fulfill both (the workload under SBA and agriculture) when its high season of work?	Yes No I am not sure	1 to 3
54.	Is it realistic that the available labor force in your family (number of mentioned people) could fulfill the workload under SBA when its high season of work?	Yes No I am not sure	1 to 3

Is there anything else you would like to say about the topics of this questionnaire?

Appendix 2

Saving Book Approach chart, used during the interviews in the field (source: Leskhoz (2011)).

	1 st year	2 nd year	3 rd year	4 th year	5 th year	6 th year
workload						
plant/forest						
harvest						
money						
% in the bank						