



## About

The project "Sustainable Land Management in the High Pamir and Pamir-Alai Mountains" (**PALM**) is an integrated trans-boundary initiative of the Governments of Kyrgyzstan and Tajikistan, established in 2007.

**PALM** tackles land degradation and poverty within one of Central Asia's crucial fresh water sources and biodiversity hotspots.

**PALM** is executed by the National Center for Mountain Regions Development in Kyrgyzstan as well as by the Centre for Support and Development of Protected Areas in Tajikistan.

**PALM** is a project funded by the Global Environmental Facility (GEF) and other partners. The United Nations Environment Programme (UNEP) is the GEF implementing agency. The United Nations University (UNU) is the international executing agency.

## Editorial



Dear readers of the PALM newsletter,

Welcome to the new issue of the project newsletter. This aims to update you on implementation of the PALM project in the Pamir-Alai region. On behalf of the Committee for Environmental Protection under the Government of the Republic of Tajikistan, I would like to describe to you the prospects for the project in the Republic of Tajikistan. The Government of Tajikistan is implementing measures necessary to improve land management and biodiversity conservation, which will consequently improve well-being in rural communities, reduce the burden on natural re-

sources and contribute to economic stability of the mountainous regions.

These measures include the development of national action plans, the implementation of international treaties and agreements, and the development of various national and international projects and programs within the ministries and departments.

The project "Sustainable Land Management in the High Pamir and Pamir-Alai Mountains" is one of trans-boundary and interstate importance. An important outcome of the project is the identification of issues and priorities of the trans-boundary cooperation between Tajikistan and Kyrgyzstan in the Pamir-Alai region.

The Governments of Tajikistan and Kyrgyzstan have created the necessary prerequisites for effective cooperation in land management. Together we have signed a Memorandum of Cooperation to jointly implement a Strategy and Action Plan for the Sustainable Land Management in the High Pamir and Pamir-Alai Mountains.

The Project has already carried out a series of forums,

workshops, seminars and round tables, including international events that are very important for developing public awareness of sustainable use of natural resources. The Committee for Environmental Protection will make the maximum effort to coordinate PALM implementation activities in Tajikistan.

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## Hadicha Yamakova

**With deep regret we inform you about the tragic death of Ms Hadicha Yamakova, a member of the PALM legal expert group in Tajikistan.**



Hadicha Yamakova was the Head of the State Registration Authority for Legal Acts and Law Codes of the Republic

of Tajikistan. During her involvement in the PALM project, Hadicha worked as an expert lawyer in the Legal Task Force group. She conducted an overview and analysis of the Tajik legislation in

the field of environmental protection, land use and farming. Her report and valuable recommendations were included in the "Strategy and Action Plan on Sustainable Land Management in High Pamir and Pamir-Alai".

Hadicha Yamakova was always known for her professionalism, kindness and understanding. She will always stay in our hearts as a remarkable person and will be greatly missed by her family, colleagues and friends.

## INSIDE THIS ISSUE

### TRAININGS

Training on Medicinal Herbs Management	2
Training on Orchards Development	3
Trainings on Water and Land Management and Biodiversity Conservation	4
Training on Integrated Pest Management	4
Regional Training Workshop on Knowledge Management	5
Research Findings Integrated in Training on Sustainable Land Management	6-7
Community trainings on Land Management, Biodiversity Conservation and Sustainable Technologies	8-9
Training on Management of Mountain Ecosystems and Eco-tourism	10-11

### RECENT EVENTS

Second Round of Micro-Projects	12
PATSAP Launch	13
NSC meeting in Kyrgyzstan	13
PALM team	14

<b>CALENDAR</b>	<b>15-16</b>
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# Trainings in Tajikistan

## Training on Medicinal Herb Management

On 15 April 2011, the PALM Project National Executing Agency (NEA) in Tajikistan, which is the Committee on Environment Protection under the Government of Tajikistan, organized a training programme on “Collection, Processing and Storage of Medicinal Herbs” in Jirgital district. The principal aim of the programme was to raise awareness among farmers of medicinal herbs as an important local resource, and to discuss possibilities for, and barriers to their sustainable utilization.

Participants in the training programme included farmers, representatives from non-governmental organizations, such as the Mountain Societies Development Support Program (MSDSP), district level forestry authorities, representatives from the committee for environmental protection, as well as private entrepreneurs and other stakeholders.

Participants were responsible for compliance with the rules and regulations for the collection, storage and transportation of herbal plants.

Today, the collection of the herbs is hindered by a lack of collection points and low market demand for medicinal herbs. For these reasons farmers are not widely engaged in collecting medicinal herbs. Indi-

### Possible solutions to problems of medicinal herb management

According to the participants in the training programme, the best solution to these problems is the development of programs and projects that involve local communities in problem-solving activities related to the collection and use of valuable herbal plants in Tajikistan. In particular, efforts should be made to study how medicinal plants can be used as a valuable resource, and to train farmers in methods of collecting, processing, storage and transportation of medicinal plants. Other measures should also be implemented to prevent the extinction of species of medicinal herbs, and to establish facilities for their processing.

Equally important is the creation of a list of local medicinal plant species. Local communities must consider medicinal herbs in the evaluation and planning of regional resources.

The training programme was very important for the farmers, as many of them for the first time acquired relevant information on the status and problems of herbal use in Jirgital district of Tajikistan.

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During the training on medical herb management

### Problems of medicinal herb management

The training programme provided an overview of the types and state of medicinal herbs, problems of plant degradation, opportunities and regulations for herb collection, processing and storage, as well as analysis and evaluation of demand and distribution opportunities for certain types of medicinal herbs. Special attention was given to medicinal herbs in Jirgital district and possibilities for their sustainable use and management.

During the Soviet period, available medicinal plants were collected and then brought to specially arranged collection points by the forestry officials. These officials had knowledge and skills in collecting medi-

vidual collectors, however, usually lacking the necessary knowledge in botany, receive orders from residents of the cities, including Dushanbe, for collection of certain types of medicinal herbs. Herbal collectors also often consume the medicinal herbs themselves, and this can be very risky and even life threatening.

Uncontrolled grazing of animal stock, associated with the limited recognition of medicinal herbs as a valuable resource, leads to the extinction of many types of medicinal plants. Landslides and the washout of riverbanks during floods and high water levels in rivers also lead to the extinction of numerous species of medicinal plants, especially sea buckthorn shrubs.

## Training on Orchard Development

Alongside the training on medicinal herbs, the NEA in Tajikistan also organized a training programme for trainers on “Improvement of Skills, Knowledge and Experience of Local Farmers in Orchard Development.” It was aimed primarily at informing the local population about horticultural methods, as almost no attention has been paid to this important issue in Tajikistan since the Soviet Union times. The training programme served as a forum for discussions on specific problems related to the development of orchards in Jirgital district and covered practical aspects of horticultural activities.

The training programme was held in Jirgital, Tajikistan on 16 April 2011. The Director of the Scientific Research Institute of Forestry, under the Government of Tajikistan organized the event. Representatives of local state authorities, field coordinators and trainers of MSDSP, farmers and other stakeholders attended the training programme.

The training programme covered several important issues, including enhancement of the skills, knowledge and experience of local farmers in regard to creating orchards, basic rules and principles of planting, orchard development and plant rehabilitation, as well as measures to combat diseases and pests.

### Identifying the problems

During the discussions, the participants identified several major problems related to orchard development. First, during the Soviet times, collective and state farms usually had professional workers and agronomists, who developed horticulture in compliance with specific agronomic practices. After the collapse of the Soviet Union,

farmers started owning their land but their skills were not necessarily linked to agriculture. Secondly, this problem has been aggravated by the inability of small farms to apply for support from international organizations or to hire personnel that have practical knowledge of horticulture.

Other specific problems of orchard development include the inaccessibility and high cost of mineral fertilizers and a lack of information on their application, the high cost of gardening equipment and tools, and adverse weather conditions during the planting season (hail, torrential rains, droughts and other natural hazards). Local farmers also need to buy expensive plants imported from other regions of the country. In Tajikistan, there is limited production of local seedlings and only a few nursery gardens exist for the cultivation of species of seedlings adapted to local climatic conditions.

### Practical part of the training programme

The most appreciated aspect of the training was the practical part. Methods of soil preparation, orchard layout, seed plant-

ing, pruning and care of seedlings were demonstrated by the invited specialists. Additionally, the moderators of this training session for trainers provided specific advice on orchard protection against pests and diseases. During the training programme, the participants were able to obtain complete information on all phases of work involved in the effective management of horticulture activities.

A brochure on horticultural principles was prepared for the training programme by the Director of the Scientific Research Institute of Forestry of the Committee for Environmental Protection under the Government of Tajikistan. The brochure served as a manual for the local farmers, and provided necessary knowledge about orchard development.

In the course of the training programme it was noted that ongoing micro-projects supported by PALM and focusing on horticultural development in Jirgital raised awareness of horticulture as a promising income-generating option and enabled individual farmers to gain practical knowledge through experience. However, there is also a need for further research and compilation of good practices in order to enable dissemination of successful experiences among other communities.

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Participants of the training on orchards development

# Trainings in Tajikistan

## Training programmes on Water and Land Management and Biodiversity Conservation

The PALM partner agency, Mountain Societies Development Support Programme (MSDSP), initiated a number of training programmes in local communities from 16 March to 26 May 2011. The programmes were intended to raise local awareness of two issues: the current state of water resources and biodiversity conservation in Tajikistan.

Last year, MSDSP organized training programmes on the cultivation and planting of fodder crops, on renewable energy resources, and on the concept of ecological balance in nature. A new round of training programmes in 2011 focused on sustainable ways to manage land and water resources with less burden on ecosystem services. Specifically, new MSDSP training programmes were organized on water and land management and on biodiversity conservation.

The training of trainers (ToT) on the two topics was conducted by experts from the Pamir Biological Institute, Khorog State University, the University of Central Asia, and the Aga Khan Foundation of Afghanistan. The ToT on water and land management took place on 16-17 March 2010, while the ToT on biodiversity conservation was held on 26-27 April 2011. These training programmes involved 27 participants from different governmental and non-



Training of trainers on biodiversity

governmental organizations, and representatives from regional districts. All of the participants were provided with handouts on land and water management, and on biodiversity issues.

Based on the newly acquired knowledge, MSDSP experts then conducted community training on the two topics in Shughnan, Ishkashim Murghab, GBAO, ALichur, Vankala and Shitkharv districts. More than 400 farmers took part in the training programmes. More than 30 percent of them were women.

During the training programmes, the participants discussed current issues of land and water manage-

ment and biodiversity conservation. After the discussions, basic concepts of new technologies were presented in addressing land and water management problems. These are especially important because agriculture is the primary source of living for the majority of the Tajik communities.

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Training in Chulbai village

## Training on Integrated Pest Management

During the years of independence of the Republic of Tajikistan and the transition to a market economy, many collective and state farms were reorganized, giving a new start to almost 40,000 individual farm households. Unfortunately, crop yields in these farms remain low, mostly due to lack of farming knowledge, especially knowledge about protection of crops from pests, diseases and weeds. To address this problem, the PALM team in Tajikistan held a training programme on integrated pest management to provide more information for farmers on the possibilities of pest control in agricultural fields.

The training on Integrated Pest Management was held on 24-25 June 2011 by Mr Nurali Saidov, Head of the State institution for specially protected natural areas, and Mr. Anwar Dzhilov, Head of the Department of Plant Protection, Institute of Agriculture Academy of Sciences of Tajikistan. Its primary goal was to introduce integrated pest management in agro ecosystems, and the use of biological and cultural control methods against pests and diseases as the most desirable forms of pest management.

After presentations and discussions, the participants agreed that

integrated pest management in Tajikistan could be achieved in several interconnected ways. First, the majority of farmers still do not have sufficient access to information about pest control; therefore, it is very important to disseminate information on pest control and economic thresholds for crop protection. Second, use of modern technologies for biological control is becoming even more significant for farmers, who are in need in new technologies to fulfil the agricultural potential of their land. Synthetically produced pesticides, fungicides and herbicides can be used as a last

resort to combat pests affecting agricultural crops. At the end of the training programme, the participants agreed on the necessity to organize field schools for farmers and to receive feedback on the field experiences of farmers at each pilot site.

Additionally, the PALM team in Tajikistan prepared and published a booklet on integrated plant protection in the Tajik language, and this was handed out to the participants in the training programme.

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## Regional Training Workshop on Knowledge Management and Communication

Following one of the recommendations of the Mid-Term Review of the PALM project to streamline its communications and knowledge management (KM) activities, a two-day regional training workshop for project staff was held in Bishkek in May 2011. The workshop was aimed primarily at identifying strategic priorities for communications and KM activities and enhancing the skills and capacities of the project staff for effective management and communication of knowledge generated within the framework of the project.

### Knowledge Management

During the first day of the workshop, participants explored key concepts and aspects of knowledge management. Specifically, they discussed the difference between the concepts of *data*, *information* and *knowledge* and reflected on what these concepts meant for the PALM project. They clarified the difference between knowledge *management* (collecting and disseminating the already existing knowledge) and knowledge *creation* (increasing the amount of knowledge, mainly through maximizing the experience). During the discussion, the groups came up with a graphic model connecting the above concepts and emphasizing the importance of accumulated *experience*, particularly in the framework of the PALM project (Fig. 1).



Figure 1. Diagram representing the links between data, information, experience and knowledge developed by the workshop participants

Consideration of the practical implications of the conceptual framework focused attention on the complexity of what *exactly* makes a project successful. Participants noted that what appears to be an identical technique and/or approach does not always work, even in a very similar context. In this connection they explored the differences between *tacit* and *explicit* knowledge and the implications of the above for

dissemination of good land use and management practices in the framework of the PALM project. Special emphasis was placed on the crucial role of local formal or informal “leaders” who are “enthusiastic” about testing and implementing the new land use and management approaches, and possible ways of identifying and supporting such leaders were discussed.

### Communication

During the *second* day of the workshop the participants focused mainly on the communications aspects of knowledge management in the PALM project. They agreed that the ultimate *purpose* of the PALM communications strategy is to support the main goal of the project itself, i.e. to contribute to sustainable land management in the project area. This could be achieved by focusing communications primarily on disseminating knowledge and experience of sustainable land management accumulated in PALM pilot micro-projects to farmers and other primary land users (as the key target audience).

The participants also explored various ways of managing and communicating knowledge and experience at various levels (local, district, national and international). In the course of the discussion they suggested that, in addition to creating “permanent” systems and structures (e.g. creating knowledge management and information centres) for preserving the accumulated knowledge wherever necessary, the PALM project should focus on disseminating this knowledge as widely as possible among all audiences, thereby “planting the (knowledge) seeds” that would “grow” and spread “naturally” after the pro-

ject is over.

Noting that it may or may not be possible to directly observe the spreading of the accumulated knowledge and experience during the current project cycle, the participants agreed that the pro-



During the regional workshop on knowledge management

ject activities in 2011-2012 should focus on maximizing possibilities for spreading knowledge and experience in the future, e.g. by including relevant courses in university curricula, maximizing the number of knowledge-sharing events, increasing the number of participants at such events etc. They also suggested focusing mainly on “what works” and to approach knowledge-sharing as a continuous “natural”, “living” process, rather than attempting to formalize it within a particular structure

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# Trainings in Tajikistan

## Research findings integrated in training on SLM for advisory service providers and farmers at PALM pilot sites in GBAO

Preliminary results from research undertaken by PALM partners and adaptive research grant holders are beginning to provide targeted knowledge about the rates and causes of land degradation observed in the region and about possibilities for reducing soil losses and improving the productivity of land resources in the Pamir-Alai region. To bring this knowledge to land users themselves, two district level training workshops on land degradation and options for improved land use and management were organized in May 2011 at Shitharv and Vankala, two of the PALM pilot sites in the Gorno-Badakhshan Autonomous Oblast (GBAO) in Tajikistan.

The training workshops brought together more than 50 land users, agricultural experts, advisory service providers and representatives from relevant state agencies working in the two districts. The workshops were led by Dr. Valentin Golosov, who is a consultant of the International Atomic Energy Agency (IAEA) and a professor from the Russian Academy of Sciences. Dr Golosov summarized available research and data on climatic changes observed in the region and presented the preliminary findings on soil erosion rate assessments he had conducted at the two sites. This served as a basis for discussion of land degradation trends and options for improved land management.



Group discussions at the workshop in Shitharv

Presentations were also made by scientists from the Soil Institute and the Pamir Biological Institute engaged in adaptive research projects in the framework of PALM, as well as by government representatives from relevant state agencies in GBAO. The workshops were combined with field visits to PALM micro-project plots, which provided a demonstration of locally-tested technologies and approaches for improved use and management of local resources, and formed

the basis for discussion on further steps needed for ensuring the sustainable management of land resources in the region.

### Soil erosion assessment

Dr. Golosov reported that data on climatic changes reflecting the diversity of the high mountain environments in the Pamirs is lacking. However, the preliminary results from soil erosion assessments based on analysis of fallout radionuclides conducted jointly by IAEA and the Soil Institute in Tajikistan in the framework of the PALM Project indicate that inappropriate land use and management practices, rather than climatic changes are the primary drivers of land degradation in Vankala and Shitharv.

Dr. Golosov reported that up to 30-40 t/ha/yr of soil was lost from slopes where irrigation furrows were positioned with a gradient on slopes of 3-4°, and up to 20 t/ha/yr was lost on slopes of less than 3°. He indicated that over a 50-year period more than 15 cm of soil would be lost because of erosion, largely due to irrigation. In light of these results, he recommended that irrigation furrows be made across slopes and that terraces be used for cultivation of slopes on valley sides and combined with forest shelter belts on slopes exceeding 8°. Furthermore, he highlighted the fact that soils on cultivated slopes in the regions are shallow and contain a high proportion of gravel and sand, resulting in water moving quickly below the plant roots, to depths of up to

1.5 m. To avoid the loss of water, soil and nutrients, he recommended that the volume of water used for irrigation should be reduced, and the frequency of irrigation, if needed, should be increased. Such changes in water use practices would enable communities to reduce the rates of degradation and to adapt to the growing water scarcity predicted in the region.

### Analysis of good land use and management practices

Additional options for improved land use and management in the region were presented by Ms. Nekushoeva from the Soil Institute, who documented and analysed a range of sustainable land management technologies and approaches employed by individual farmers at the two sites in the framework of a PALM adaptive research project. Specifically, she noted that improved live fences of trees around crop fields can help to create a favourable micro-climate for crop cultivation, and can mitigate the negative impacts of climatic changes increasingly observed in the region. Inter-cropping of fruit trees with alfalfa can bring extra income, while enriching unproductive soils and preventing soil erosion, and bare lands can be reclaimed through the cultivation of beans. These and other good management practices documented in the framework of the project will be included in the World Overview of Conservation Approaches and Technologies (WOCAT), and soil samples collected and analysed will be used to develop a soil library with the help of the University of Bern in Switzerland. (cont. p. 7)

## Fodder crop cultivation in the context of a changing climate

Dr. Khudodod Aknazarov, from the Pamir Biological Institute, who is also a leader of another PALM-supported adaptive research project, reported that in the context of the changing climate in the Pamirs *Secale cereale var. monthanum* and *Elymus sibiricum* L. have performed best so far among the perennial fodder crops he tested at the experimental plots established in Vankala and Alihcur, two of the PALM pilot sites.

He offered seeds to farmers who were interested in trying them in their home plots but highlighted the need for government and donor support with the establishment of seed farms to enable large-scale production and dissemination, at affordable prices, of good quality fodder crop seeds adapted to the changing climatic conditions in GBAO. He also emphasized the need for more research to enable appropriate tests and identification of varieties that are best suited to the different geographic and altitudinal zones in the region.

## Institutional approaches for improved management of forests and pastures

While no targeted research on the state of degradation of pastures and forests has been undertaken in the framework of the PALM project, participants presented their own observations and results from existing studies, and institutional approaches and frameworks for addressing the problems were discussed.

With respect to pastures, enhancing access to distant grazing lands through improvements in infrastructures, controlled use of pastures and rotational grazing were highlighted by participants and experts as feasible options for reversing on-going degradation. Mr. Murod Ergashev, the PALM Project Manager in Tajikistan, also informed the participants of on-going discussions on the development of a pasture law for Tajikistan, and urged them to

share their views on how pastures should be managed so that PALM could raise the profile of pasture use and management concerns specific to GBAO and the Pamir-Alai region in the context of relevant working groups.

Concerning forest use and management issues, Dr. Abdulnazar Abdulnazarov, the Director of the Forest Agency in GBAO, indicated that the state of forests in GBAO is affected by both climatic changes and anthropogenic factors, and he presented an overview of the agency's strategy, which attempts to mitigate negative pressures through a series of targeted approaches and measures. Specifically, he informed the

participants that a Joint Forest Management (JFM) approach, initiated and tested in selected areas with the support of the German International Cooperation Agency (GIZ), has proved successful in reducing forest degradation, and its up-scaling in other regions is under way.

## Field visits to micro-project sites, and follow-up

The field visits to selected micro-projects supported by the PALM project indicated that work is already on-going in line with some of the recommendations. Notably, terraces have been used to reclaim marginal land on degraded slopes, improvements in irrigation infrastructure are enhancing access to scarce water resources in the dry summers, and bridges are improving access to summer pastures, thus leading to improvements in livestock productivity and a reduction of pressure on nearby pastures. Furthermore, a shift towards cultivation of nitrogen fixing perennial fodder crops enabled by the project is expected to provide better winter feed, while enhancing soil quality, vegetation

cover and carbon sequestration, and also reducing vulnerability to the growing frequency of freezes in summer.

Options for further improvements in the use and management of natural resources that farmers themselves can undertake were discussed during the training programme and will be disseminated further through community meetings and information leaflets. Fur-



Terraces established with support from PALM in Shitharv

thermore, representatives of the PALM field facilitating agencies committed to integrating these improvements them in the implementation of the second round of PALM micro-projects and in their work in other regions facing similar problems.

Targeted policy issues that required attention, such as the need to reclassify unproductive land in the high mountains and thus to reduce the tax burden for farmers, were highlighted, and the national executing agency of the PALM project undertook to bring these matters to the attention of relevant policy-makers and government bodies. At the same time, noting the growing importance of understanding climatic changes manifested in the region, researchers committed to exploring the scope for obtaining donor funding to establish better facilities for monitoring climate change in the high mountain areas of GBAO, which are currently not covered by regular meteorological observations.

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# Trainings in Kyrgyzstan

## Community Training programmes on Land Management, Biodiversity Conservation and Sustainable Technologies

In May 2011, the PALM field office in Osh, Kyrgyzstan announced a tender to organize training programmes on selected topics identified by local communities. Five organizations were chosen and training programmes were organized between 15 May to 6 June 2011. Topics covered issues related to sustainable land management, biodiversity conservation and alternative energy resources, which were aimed at bringing new insights into the possibilities for sustainable livelihoods in Kyrgyz rural communities.

### Training programmes on improvement of natural grasslands and pastures

Training programmes on improvement of natural grasslands and pastures were organized at all of the PALM pilot sites from 15 May to 5 June 2011. More than 266 people from eight different villages participated in these training programmes, which were led by Mr. A. Satanov, the Chairman of the public foundation, Biorelikt. In the course of the training programmes, participants were asked to discuss and identify reasons for pasture degradation, and to analyse measures for their protection and restoration. It was highlighted that local communities can reduce the burden on pastures by rotation of the pastures, planting forage crops, establishment of human-made pastures, improvement of grazing techniques and improvement of control over pests and diseases of wild and cultivated forage crops. Furthermore, it was noted that grazing could be organized according to the different grazing patterns of domestic livestock, so as to enable optimal use of pasture resources. In accordance with this method, herds of horses are usually allowed to graze first, then cattle are taken to the pasture, and finally, herds of sheep and goats are allowed to graze. As pastures provide the primary livelihood for the local population in the Pamir-Alai mountains, the training programme was of particular interest to local communities.

### Training programmes on the establishment of controlled grazing and hay fields, mini-sanctuaries and nature reserves

Training programmes on the establishment of controlled field and mini-sanctuaries were held on 23-28 May by the public foundation, Aybike. Ms. Toktokan Kokkozova, a senior fellow at the Kara-Shorinskiy National Park was a moderator for these training programmes. After a series of discussions about the number and types of the endangered species in Kyrgyzstan, Ms. Kokkozova presented several methods that could help to protect endangered species in the mountainous areas. One of

protective structures. They can make up to 90% of the barriers used in the protected territory. The remaining 10% can be constructed from barbed wire and other protective materials.

At the end of the training programmes, the participants were asked to develop plan-diagrams for the creation of micro-reserves near their village areas, as well as to calculate the estimated cost of construction of protective structures and to calculate the economic and environmental benefits from this activity. The training programmes on establishment of controlled field and mini-sanctuaries were attended by a total of 48 representatives of local communities.

### Methods for improving breeds of domestic livestock.

The training programmes were led by Associate Professor Mr. E. Ismailov from the Department of Agriculture of Osh State University. They were organized on 15-18 May in Alaiku sub-district. During the first part of the training programmes, the participants discussed existing breeds of livestock in the territory of Alaiku. Different issues were then discussed related to the improvement of cattle breeding: the origin of domestic animals, wild ancestors of domestic animals and pets, and possibilities for the selection of livestock breeds adapted to the conditions of mountain areas. Several scientific methods to improve breed structure were mentioned, such as methods of inbreeding, (cont. p. 9)



Community training session

them is to establish protected mini-sanctuaries and nature reserves. In mountain areas the creation of protected areas is possible by setting up fences, which prevent trespassing by humans and domestic livestock on the protected territory. Natural barriers can be used to separate the protected territory from used pastures. Such barriers can have terrain and natural elements: rocks, high hills, ravines, thickets, shrubs and trees, which can be used effectively as

updating hybridization and introducing hybridization, each having its advantages and disadvantages. At the end, each participant in the training programme was given a handout that contained more detailed information about major breeds of livestock in Central Asia and other mountain regions in the world, and on teaching methods and techniques to improve composition of livestock and other issues related to livestock breeding.

### Training programmes on alternative energy sources in the highlands.

In order to facilitate sustainable development, knowledge about alternative energy resources is very important for the local populations.

The training programmes on alternative energy sources in the highlands were held on 2-5 June. They were led by Mr. I.M. Arykbaev, Director of In-tech Plus LLC in Kashkasuu sub-district. The training programmes were attended by 55 people. During the training programmes, the participants learned about the operating principles, capabilities, and advantages and disadvantages of alternative energy sources. In Kyrgyzstan, it is possible to use five types of alternative energy source: geothermal energy (for heating houses, greenhouses, etc), wind energy, hydropower energy, biogas and solar energy. These training programmes were of particular importance for the people, because the high cost of energy resources is one of the factors affecting poverty in local communities.

### Innovative technologies for irrigation in the highlands.

Training programmes on irrigation technologies were organized on 21-24 May in the Lenin pilot

sub-district. They were led by Mr. H. Orozaliev, a trainer from the Public Foundation, Bios. At the beginning of the training programme, the participants discussed land use possibilities in mountain areas where there are good conditions for



Community training session

growing vegetables, grains, fruit and other crops. The training participants highlighted the presence of fairly large areas of natural pastures and hayfields located on mountain terraces. Terraced land is mainly located on the slopes that face the beds of mountain streams and rivers. However, access to water for irrigation and crop cultivation in such areas is limited, despite the immediate vicinity of flowing mountain rivers. A number of technologies exist that can enable the delivery of irrigation water from rivers to terraced mountain land, which is often located hundreds of metres above the level of the river channels. These were all presented by Mr. Orozaliev. Among the most practical irrigational technology discussed were "Charkpalak" and "Gidrotaran" systems. These two systems are based on water pumps, and estimated costs for their construction vary between 1,000-2,000 US dollars. The area of agricultural land in Kyrgyzstan could be increased by up to 14 thousand ha by

using such irrigation systems.

### Training materials

At the end of all training programmes, the participants were given handout materials on the protection of plants and animals, especially protected natural territories, domestication of animals in the highlands, "Gidrotaran" and "Charkpalak" irrigation systems, and alternative energy sources (biogas, solar and wind energy).

The training programmes were attended by 489 people, including representatives of local communities and state authorities.

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	Topic of the training				
	improvement of natural grasslands and pastures	establishment of reserves, fields, etc.	breeds of domestic livestock	alternative energy sources	irrigation technologies
Location of the training	Zhany-Turmush, Miyadzdi, Jospholu ayil okrug	Kokart, Kankor-gon, Alay-kusky ayil okrug	Achyk-Suu, Kashka-Suu, Kashka-Suu ayil okrug	Sogondu, Murdash, Lenin ayil okrug	Zhany-Turmush, Mizaldi, Kokart, Konkor-gon, Achyk-Suu, Kashka-Suu, Sogondu, Murdash
Date	23-28 May	15-18 May	2-5 June	21-24 May	15 May-5 June
Participants	48	64	55	56	266

# Trainings in Kyrgyzstan

## Training Programme on Management of Mountain Ecosystems and the Development of Eco-tourism

On 9-10 July, the PALM office in Kyrgyzstan organized a regional training programme on management of mountain ecosystems and the development of ecotourism in Kashka-Suu, Chon-Alai district. The main objective of this training programme was to raise awareness about the ecological system of the Pamir and Pamir-Alai mountains, trends of human impacts on mountains, and impacts of global climate change, while at the same time to look into possibilities for coexistence of conservation and use of natural resources of highlands.

### Challenges and opportunities for mountain ecosystems

More than 60 participants were invited to take part in the training programme on management of mountain ecosystems and the development of ecotourism, including a delegation from Tajikistan, representatives of the State Agency for Environmental Protection and Forestry under the Government of Kyrgyzstan, the Department of the Ministry of Agriculture and Pastures of Kyrgyzstan, the Department of International Relations and Investment in the city of Osh, UNU-EHS, Osh State University, private tourism agencies and members of the local population.



During the training

Mr. Suerkul Osmonov, a regional representative of the State Agency for Environmental Protection and Forestry under the Government of Kyrgyzstan in Alai region, and Mr. Dodudzhon Saidov, the head of the Department for Monitoring of the State agency for the Protected Ar-

reas of Tajikistan gave a presentation about the status, problems and prospects of biodiversity in mountain ecosystems, and about transboundary issues involved in solving these problems.

Climate change, inefficient use of water resources, land degradation and reduction of biodiversity were the key issues of transboundary importance that were discussed during the training programme. Climate change has already caused melting and disappearance of more than 1,000 small and medium-sized glaciers in the mountains of the Central Asia, which are usually the main source of drinking and irrigation water for the local population. The loss of reserves of fresh water is a real threat to

food and environmental safety in the Pamir and Pamir-Alai.

Additionally, soil erosion and a decline in land productivity in the mountains of Kyrgyzstan and Tajikistan have also reached critical levels. The destruction of natural ecosystems and uncontrolled use of biological resources are two main threats to biodiversity. As a result of anthropogenic factors such as overgrazing, mowing, recreational use and road construction, some significant changes have taken place in the structure and productivity of plant communities.

The participants also mentioned active pressure on the forest ecosystems, resulting from cutting down trees and shrubs and even fruit orchards to meet energy needs. In the Soviet period these processes were not so important for biodiversity, but in the last 20 years, wildlife resources have become overexploited. The overuse of resources is mostly caused by poverty and the difficult living conditions in the mountains. The participants especially mentioned the poor condition of the juniper forests. Over the last 60-70 years these have suffered from the processes of land degradation. Environmental causes (draughts) and socio-economic conditions (the need for firewood) have led to a 60% reduction of the juniper forests.

Due to destruction of natural ecosystems and uncontrolled use of biological resources, many species are on the verge of extinction or are at risk of extinction. Some animals have almost disappeared from the mountain ecosystems, such as the Marco Polo sheep (*Ovis amon polii*) or Himalayan Brown Bear (*Ursus arctos isabellinus*). According to some estimations, the number of snow leopards (*Uncia uncia*) has decreased during the period from 1990 to the present by 90%.

In recent decades people have started hunting Corsac (*Vulpes corsac*) and Scarlettailed marmot (*Marmota caudate*).

(cont. p. 11)

Central Asian otter populations, as well as Alai rodents (*Ellobius alaicus*), which are found only in the Alai mountains, are also slowly disappearing. During the discussions, the participants agreed on the need for urgent measures to preserve natural ecosystems, in particular, by:

1. *Expanding the network of protected areas.* It has been agreed that to preserve the natural ecosystems and especially rare, endangered and endemic species of flora and fauna, there needs to be an expansion of the network of protected areas in the region, especially in parts of the Alai region.

2. *Involvement of local communities in biodiversity management and promotion of environmental awareness.* To increase the involvement of local people in biodiversity management it is necessary to develop financial incentives. During the training programme the creation of public protected areas with different protection regimes (seasonal sanctuaries, recreational areas, etc.) was mentioned.

3. Given the economic situation in Kyrgyzstan and Tajikistan, *the importance of international and transboundary cooperation is growing.* To focus efforts on the preservation of vulnerable ecosystems and species, there is a need to develop transboundary and international projects and programs

for studying and monitoring the status of endangered species and fragile ecosystems. Then it is important to implement appropriate measures based on the results, and to use technology to protect and restore the special flora and fauna, and safeguard threatened species.



Tourist information stand about Lenin Peak

### Development of eco-tourism

The second half of the training programme was devoted to the prospects for eco-tourism development in mountain areas. The training programme took place in a camp, located at 4,000 metres above sea level and 15 km from the alpinist camp for climbers wishing to climb the Lenin peak.

should also involve local communities in the development of the industry. Through such involvement they could receive financial and other benefits.

At the end of the discussion, it was suggested that local tourism in the region could be developed in the form of seasonal renting. This could include a combination of renting of temporary housing, horses for

**Lenin Peak is a mountain peak, located in the Pamir mountain system, on the border between Kyrgyzstan and Tajikistan. It is one of the highest peaks in Central Asia. Its height is 7,134 metres above sea level. More than 16 climbing routes have been established, several of which are accessible for tourists. Climate conditions in the area of the Pamirs are relatively favourable for tourism and thus there is a good opportunity for development of tourist camps for sightseeing and climbing.**

During the training programme, Mr. Ernisebek Alaychiev, Ph.D., associate professor at Osh State University, presented a paper on mountain tourism in Kyrgyzstan (Lenin Peak as an example of a tourist attraction). Additionally, Prof. Abdurashit Nizamiev, head of the Department of International Relations and Investment in the city of Osh gave a speech about the public policy of tourism development and tourism potential in Kyrgyzstan, in particular, in the city of Osh.

horseback riding, sightseeing, etc. The participants also mentioned that more professional specialists should be trained in the field of tourism and consumer relations at Kyrgyz higher institutions.

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Lenin Peak in Kyrgyzstan on a postage stamp prepared for the International Year of Mountains in 2000.

During the discussion, the training participants recognized the need for special measures for the development of a tourism infrastructure. The organization of tourism activities

# Recent Activities

## Second Round of Micro-Projects under Implementation

Sixty-one micro-projects aimed at improving the health and productivity of land resources in the Pamir-Alai region were selected for funding by PALM from a total of 73 proposals submitted for review in 2011. A review by experts, including Kyrgyz and Tajik scientists and policymakers, was completed in March 2011, and micro-project implementation is underway.

The micro-projects are expected to lead to the improved management of 3080 ha of land and to benefit 2205 households, of which 1712 (78%) are poor, across 47 communities in the Pamir-Alai region. They will do so by pilot-testing different measures for improved land use and management. These measures have been identified and prioritized through a process of community mobilization and land use planning facilitated by the Mountain Societies Development Support Program (MSDSP) in Tajikistan and the PALM Osh Office at the University of Osh in Kyrgyzstan.

Given the scarce arable land resources in the region, ca. 50% of all micro-projects (22 in Tajikistan and nine in Kyrgyzstan) involve inter-cropping or various multi-functional land use and management systems, usually involving fodder crop cultivation as one element. In Tajikistan, nitrogen fixing perennial plants such as *Sainfoin* and *Lucerne* will be planted together with new varieties of fruit trees in Jirgital (18 micro-projects) and with annual crops such as wheat and barley in the Western Pamirs (four micro-projects). In Kyrgyzstan they will be cultivated most often in protected forest and pasture management systems (nine micro-projects).



Cultivation of Sainfoin is used to restore degraded slope-lands across the PALM pilot sites

Another 40% of the micro-projects (14 in Tajikistan and 10 in Kyrgyzstan) are aimed at targeted enhancements of the productivity of croplands, hay fields, pastures, and forests. The projects include repair and reconstruction of irrigation canals and pumping systems (four projects in GBAO, Tajikistan and two in Kyrgyzstan), fencing, irrigation and/or seeding of grasslands (four projects in GBAO, Tajikistan and two in Kyrgyzstan), reconstruction of roads and bridges to summer pastures (six projects in Jirgital, Tajikistan), and fencing off existing forests or establishment of new plantations (six projects in Kyrgyzstan).

Of the remaining 10% of the funded projects (four in Tajikistan and two in Kyrgyzstan), half are aimed at reducing pressure on forest and shrub vegetation through house insulation, and the other half are intended to test productivity enhancing and income-generating initiatives that are innovative for the area, such as compost making, garlic cultivation and breeding of traditional horse varieties.

Notable in terms of innovation is the fact that the nine multi-foci projects in Kyrgyzstan (15% of the total) entail an explicit objective of local biodiversity conservation through controlled use of forests, pastures, and other resources in designated community protected areas. If successful,

the innovative approach tested by the pilot communities would enhance the chances of survival of endemic and endangered species which inhabit the region, such as the Saker Falcon (*Falco cherrug*), the Golden Eagle (*Aquila chrysaetos*), the Himalayan Griffon (*Gyps himalayensis*),



Community protected area called „Eagle's nest“, Kashkasuu, Kyrgyzstan

the Bearded Vulture (*Gypaetus barbatus*), the Eurasian Tawny Owl (*Strix aluco*), the Indian Crested Porcupine (*Hystrrix indica*), the Euroasian otter (*Lutra lutra*), and the Euroasian Lynx (*Lynx lynx*).

The micro-projects funded in 2011 represent the second of two rounds of community projects supported by PALM. In the first round, which took place in 2010, 104 projects (74 in Tajikistan and 30 in Kyrgyzstan) were funded and their implementation is for the most part complete. In both rounds, grant funds had to be matched with 30% community co-financing. On average, committed and mobilized co-financing has covered 45% of the total cost of the projects, indicating a strong interest from local stakeholders, and a high likelihood that supported land use management changes will be maintained and will continue to provide benefits in the future.

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## Launch of Strategy and Action Plan in Tajikistan

On February 28, a Memorandum of Cooperation on sustainable land use was signed between Tajikistan and Kyrgyzstan. Cooperation between neighbouring administrative units of Kyrgyzstan and Tajikistan will create opportunities for sustainable land use practices, regional development, and the expansion of diverse cultural contacts between the Republics of Kyrgyzstan and Tajikistan.

The official launch of the Strategy and Action Plan for the Sustainable Land Management in the Pamir-Alai mountains took place on 1 March 2011, following the signature of the Memorandum of Cooperation between the official delegates of Kyrgyzstan and Tajikistan.



Official signing of the Memorandum

Parties to the Memorandum of Cooperation were the Committee for Environmental Protection under the Government of the Republic of Tajikistan, the State Agency of Environmental Protection and Forestry under the Government of the Kyrgyz Republic, the state administration of the Gorno-Badakhshan Autonomous Oblast of Tajikistan, the state administration of the Jirgital district of Tajikistan and the Osh Regional State Administration of the Kyrgyz Republic.

The purpose of the memorandum was to formalize the agreement of the parties to implement the Re-

gional Strategy and Action Plan. The signing ceremony was held in the building of the Committee for Environmental Protection under the Government of the Republic of Tajikistan in Dushanbe.

The first step in implementation of the Memorandum of Cooperation will be the creation of a joint cross-border commission, which will include representatives of international and public organizations and experts to supervise the realization of the regional strategy on sustainable land management.

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## National Steering Committee meeting in Kyrgyzstan

April 2011 was marked by another important event for the PALM project—the National Steering Committee (NSC) meeting in Kyrgyzstan. The NSC meeting aimed to identify opportunities to facilitate scientific research in the PALM project, and to restructure the Regional Advisory Group in order to meet the recommendations of the midterm review of the project.

The Kyrgyz National Steering Committee meeting took place on 20 April in Bishkek. In order to enhance scientific research and innovation in PALM, the following new members were included in the composition of the NSC: Prof. Almaz Shanazarov, Director of the Institute of Physiology, Academy of Mining Sciences KR, Dr. Bakyt Shamshiev, Rector of the Osh Technological University and Dr. Almaz Orozumbekov, the head of the centre "Innovative Technologies in Agriculture" FIT of the Kyrgyz National Agrarian University of Skryabin.

Alongside the NSC meeting, the



NSC meeting in Kyrgyzstan

The structure of the NSC and RAG in Kyrgyzstan was approved in 2009; however, due to the reform of state institutions at the end of 2009 and 2010, the number of members and the structure of the committee have been changed. The new NSC consists of 13 members, and the RAG has five members representing governmental agencies related to sustainable land use, use of pastures and protection of natural resources. Additionally, the NSC and RAG include representatives from the NGOs, international projects and donors.

third meeting of the Regional Advisory Group in Kyrgyzstan was held. One of the main objectives of this meeting was the adoption of the new structure of the RAG. The meeting was attended by the following representatives of the RAG in Kyrgyzstan: Mr. Aytkulov Burkhanov, General Director of the Association of forest and land users in Kyrgyzstan, and Mr. Ruslan Umaraliev, Executive Director at Aga Khan Foundation (MSDSP KG). Additionally, several observers were invited to the meeting: Mr. Talantbek Aldashev, Deputy Executive Director MSDSP KG, and Mrs. Laurie Ashley, specialist in land conservation and land use.

Based on the recommendations of the midterm review group in Sep-

tember 2010 and the decision of the International Steering Committee, it was decided to include representatives of donor organizations and international projects to enhance the effectiveness and impact of observers and advisors of the project.

As a result of the discussions, it was decided to create a Coordinating Council to implement the Regional Strategy and Action Plan on SLM, which will consist of five members, and will be chaired by the Deputy Head of the State Administration of Osh region. The possible future expansion of the Council was also decided.

**Cholpon Alibakieva**

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## Welcome to all new PALM babies!

It is with great joy that we introduce new babies that arrived in families of PALM project members recently.



On 25 May 2011, Tologon Mamatov, National Coordinator in Kyrgyzstan, and his wife became the parents of a baby girl, Alya. The baby and her proud parents are feeling fine.

Earlier this year, baby boy Sebastian arrived in the family of Georg and Darya Hirsch, a PALM Associate Academic Officer. The baby was born after much anticipation and ex-

citement on 9 May 2011. The whole family are feeling fine.

Previously in the project, a baby girl, Eldina, arrived in the family of Maksatbek Anarbaev, Administrative Officer in Kyrgyzstan. Eldina was born on 10 September 2010.

We are happy to report that all parents and babies are doing well.

Congratulations to all new Mums and Dads in the PALM project!

## Meeting the PALM Communications Officers in Kyrgyzstan and Tajikistan

Mrs. Cholpon Alibakieva and Mrs. Svetlana Jumaeva were recently recruited as PALM Communications Officers in Kyrgyzstan and Tajikistan. In their new positions, Svetlana and Cholpon will be responsible for the organization of the PALM communication and knowledge management activities in their respective countries.



Mrs. Cholpon Alibakieva

**Mrs. Cholpon Alibakieva** holds a master's degree in Environmental Science from Tsukuba University (Japan). She has worked for over 10 years in the field of environmental protection, with a particular focus on compliance of the Kyrgyz Republic's commitments under the international environmental

conventions. She has good analytical and negotiating skills and deals with public relations.

Her favourite quote is "Look deep into nature, and then you will understand everything better", by Albert Einstein.

**Mrs. Svetlana Jumaeva** studied sociology and psychology at the Moscow Academy of Management, graduating with an MA in sociology.

She has over nine years of experience working in humanitarian/disaster risk management, environmental management, and international development programs.

Before joining PALM, Svetlana worked for FOCUS Humanitarian Assistance, the Swiss Centre for Development and Environment (CDE), and the Centre for Climate Change and Disaster Reduction (CCDR), the latter being an NGO she founded in Tajikistan (Dushanbe). She has also worked as an assistant to the Coordinator of the PALM

Component I.1 in Tajikistan and supported the development of the Regional Strategy and Action Plan for Sustainable Land Management in the Pamir-Alai Mountains.

We welcome Cholpon and Svetlana to the PALM project!



Mrs. Svetlana Jumaeva

For all matters regarding PALM communications in Kyrgyzstan and Tajikistan please refer to these email addresses: **Cholpon Alibakieva** [cholponkg@gmail.com](mailto:cholponkg@gmail.com) and **Svetlana Jumaeva** [palm.kmctj@gmail.com](mailto:palm.kmctj@gmail.com).

## Past events (January-July 2011)

### Workshops and Meetings

- February 2011** 6th International Steering Committee Meeting (virtual)
- 21 February 2011** PALM side event at the Committee for the Review of the Implementation of the Convention (CRIC), UN Convention to Combat Desertification, Bonn, Germany
- 1 March 2011** Official launch of the Pamir Alai Transboundary Strategy and Action Plan (PATSAP) on Sustainable Land Management (SLM), Dushanbe, Tajikistan
- 20-21 April 2011** National Steering Committee (NSC) and Regional Advisory Group (RAG) Meeting, Bishkek, Kyrgyzstan
- 15 April 2011** Training on Medicinal Herbs Management, Jirgital, Tajikistan. **Organizer:** National Executing Agency; Committee of Environmental Protection under the Government of Tajikistan
- 16 April 2011** Training on Orchards Development, Jirgital, Tajikistan. **Organizer:** National Executing Agency; Committee on Environment Protection under the Government of Tajikistan; **Co-organizer:** Institute of Orchards Development, Tajik Agricultural Academy
- 2-5 May 2011** Regional training Workshop on Communication and knowledge management for PALM staff, Bishkek, Kyrgyzstan. **Organizer:** Regional Project Implementation Unit: UNU-EHS, Bonn, Germany
- April-May 2011** Community Trainings on Land Management, Biodiversity Conservation and Sustainable Technologies at all pilot sites in Kyrgyzstan **Organizer:** PALM field office, Osh, Kyrgyzstan
- March-May 2011** Community Trainings on Land and Water Management and Biodiversity Conservation at pilot sites in Tajikistan. **Organizer:** MSDSP, Tajikistan
- 17 June 2011** Training and demonstration of Soil and Water Conservation Technologies in Jirgital, Tajikistan (co-organized with the Soil Institute and the Agrarian University in Tajikistan)

- 24-25 June 2011** Training on Integrated Pest Management, Jirgital, Tajikistan
- 6 July 2011** Third meeting of the Pasture Coordination Council in Kyrgyzstan, Josholu, Kyrgyzstan
- 9-10 July 2011** Training on management of mountain ecosystems and the development of eco-tourism, Kasha-Suu, Kyrgyzstan
- 6-10 July 2011** Transboundary study tour to pilot sites in Kyrgyzstan
- 19 July 2011** Fourth National Steering Committee Meeting in Tajikistan

### Field Studies and Missions

- March 2011** Monitoring micro-project implementation and impacts at pilot sites in Tajikistan, PALM Regional Project Office, UNU
- May 2011** Video-documentation of good SLM practices at PALM pilot sites in Tajikistan by UNU Media Studio

### PALM was presented at

- 6-8 December 2010** **Land Degradation Assessment in Drylands (LADA) International Workshop**, Rome, Italy. **Presenter:** Nevelina I. Pachova on „Applications of LADA-L for Community-based Land Use Planning“
- 4 February 2011** **Course on „Agriculture and Representation of interests“ for junior staff in agricultural honorary offices**, Bonn, Germany. **Presenter:** Darya Hirsch on „Sustainable Land Management in the High Pamir and Pamir-Alai Mountains“
- 4 June 2011** **Round-table Discussion Mechanisms and Practices of Climate Change Adaptation at the community level**, Dushanbe, Tajikistan. **Presenter:** Murod Ergashev on “Practices of Sustainable Land Management”

## Calendar 2011

## Upcoming PALM Activities

## Workshops and Meetings

- September 2011** Training on GIS for land use and planning and management, Kyrgyzstan
- 16 September 2011** Training on eco-tourism development in Jirgital, Tajikistan
- 15-17 September 2011** Study tour to pilot sites in Tajikistan
- 19-23 September 2011** Regional Training on Participatory Development and Monitoring of Legal and Policy Frameworks for SLM in the Pamir-Alai Mountains, Bishkek, Kyrgyzstan
- 24 September 2011** Open day on SLM at Tajik Agrarian University, Dushanbe, Tajikistan
- 26-28 September 2011** Follow-up on legal proposals research and analysis
- 30 September 2011** Pasture coordination meeting in Dushanbe, Tajikistan
- October 2011** PATSAP national coordination meeting in Kyrgyzstan
- November 2011** Open day on SLM at Osh State University, Kyrgyzstan; Photo and video exhibition / festival on PALM best practices in Kyrgyzstan and Tajikistan (by agreement) at SLM Resource Center, Osh State University
- 25 November 2011** PATSAP national coordination meeting in Tajikistan

## Announcements

- 1-10 August 2011** **PALM Summer School** „Ecosystem Change in Mountain Regions: tools and methods for the assessment and problem-solving”, Alaiku aiyl okmotu, Kara Kulja district, Kyrgyzstan. **Organizers:** United Nations University-Institute for Environment and Human Security (UNU-EHS), Germany and Osh State University, Kyrgyzstan
- 30 July-14 August** **International Summer School** on Rockslides and related phenomena in the Kokomerren river valley in Kyrgyzstan. **Organizers:** Institute of Geosphere Dynamics of the Russian Academy of Sciences and the Institute of Seismology of the National Academy of Sciences of Kyrgyzstan

## Publications

PALM partners have written and contributed to the following publications related to the project:

**Lim M.** Environmental Implications of the 2010 Constitution of the Kyrgyz Republic. IUCN Academy of Environmental Law e-Journal, Issue 2011(1): 148-154.

**McGregor B., Kerven C., Toigonbaev S.** Sources of variation affecting cashmere grown in the Pamir mountain districts of Tajikistan and implications for industry development. Small Ruminant Research, Volume 99 (2011) 7-15.

**Pachova N.I., Renaud F., Jansky L.** 2011 Land Degradation, Livelihoods and Vulnerability in Pamir-Alai Mountains in Central Asia. In: K.G. Saxena, Luohui Liang, Xian Xue (eds) Global Change, Biodiversity and Livelihoods in Cold Desert Region of Asia. Bishen Singh Mahendra Pal Singh, Dehradun, India.

**Reinhard M.** 2011. Land cover and land use mapping in the Western Pamirs, Tajikistan as a foundation for an assessment of the Ecosystem Services of the agricultural system. MSc thesis, Department of Environmental Sciences, ETH Zurich, Switzerland.

**Tobler M.** 2011. Assessment of dominant land-use systems in the Tajik Pamir on the basis of a soil spectral library. MSc thesis, Department of Environmental Sciences, ETH Zurich, Switzerland.

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