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Report from the Norwegian Forest and Landscape Institute

ENVIRONMENTAL STATUS AND CHALLENGES IN AND AROUND THE FERGANA VALLEY, CENTRAL ASIA

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skog+ landskap
NORSK INSTITUTT FOR SKOG OG LANDSKAP

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Picture frontpage:

Sary Chelek National Park, Kyrgyzstan.Arnold Arnoldussen, Skog og landskap

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SUMMARY

In 2004 the Terrestrial Environmental Monitoring Project in Central Asia (TEMP-CA) was established. The project will be closed in 2010. In the project, financed by the Ministry of Foreign Affairs, Kyrgyzian, Tajik, Uzbek and Norwegian scientists cooperated. Objective for the project was the establishment of terrestrial environmental monitoring reference areas around the Fergana Valley. In total 10 monitoring reference sites were established.

As many of the monitoring sites are situated in and around the Fergana valley it is also possible to say something about the environmental status and challenges of this area, including the surrounding mountainous areas.

The Fergana Valley was always very important for the food supply of the total region. Today the area has many big challenges concerning management of its natural resources and environmental status.

The Kyrgyz Environment Action Plan (NEAP) identified five major areas of concern:

- Inefficient water resource management;
- Land degradation, mainly due to overgrazing;
- Overexploitation of fragile forest resources;
- Threat of irreversible loss of biodiversity; and
- Inefficient mining and refining practices.

Concerning the management of water resources the lack of maintenance of the existing irrigations systems is causing lack of water in certain areas and salinization. Leaking irrigation systems can cause erosion and land slides.

Both in Kyrgyzstan and Tajikistan water from the mountains is stored in barrier dams to be used for producing electricity in winter time. This is conflicting with the need for water for irrigation purposes, which is biggest in summer.

The increasing need for irrigation water results in a reduced water flow to the Aral Sea, with as consequence enormous salt problems there due to reduced water levels. The salt is transported by wind over long distances and is threatening agricultural areas and cities/villages. A changing climate will increase the mentioned problems.

The hills and mountains around the Fergana Valley are generally overgrazed, resulting in land degradation, erosion and land slides. The amount of grazing animals should be brought in balance with the capacity of the land. In some national parks grazing animals are forbidden. Both overgrazing and the stopping of all grazing are also threatening biodiversity. The whole area is known for its endemic species.

The mountains around the Fergana Valley are known for its mineral resources. Both existing and old mines give environmental problems. Mine waste from tailings and toxins can pollute large areas downstream from the mining activities. The occurrence of heavy earthquakes in the region increases the risk for events of severe pollution.

Solving the environmental problems in and around the Fergana Valley is only possible via a structural approach. Cooperation between neighbouring countries will be necessary.

The following actions may contribute:

- Developing and implementing a system for inventory of natural resources and land use
- Further development of a monitoring system like the sites established in TEMP-CA and following up the existing monitoring sites.
- Follow up of the threads caused by tailings from existing and old mines. As a result of the TEMP-CA project an application was sent to cover this element.
- Improving agriculture.
- Institutional and capacity building, and education of farmers and land managers.
- Development of legislation.

1. INTRODUCTION

In 2004 the Terrestrial Environmental Monitoring Project in Central Asia (TEMP-CA) was established. The project will be closed in 2010. In the project, financed by the Ministry of Foreign Affairs, Kyrgyzian, Tajik, Uzbek and Norwegian scientists cooperated. Objective for the project was the establishment of terrestrial environmental monitoring reference areas around the Fergana Valley. Establishment of reference areas found its origin in the signing of the agreement on long transported air pollution by the involved countries. Part of the agreement is establishing a monitoring system able to detect changes in the terrestrial ecosystem due to air pollution. It was tried to find the most isolated and “clean” areas to establish the monitoring sites. However, the monitoring methodology is also useful to identify effects of climatic and land use change on the forest ecosystems.
In total 10 sites where established *(figure 1)*: 6 in Kyrgyzstan, 3 in Uzbekistan and 1 in Tajikistan.

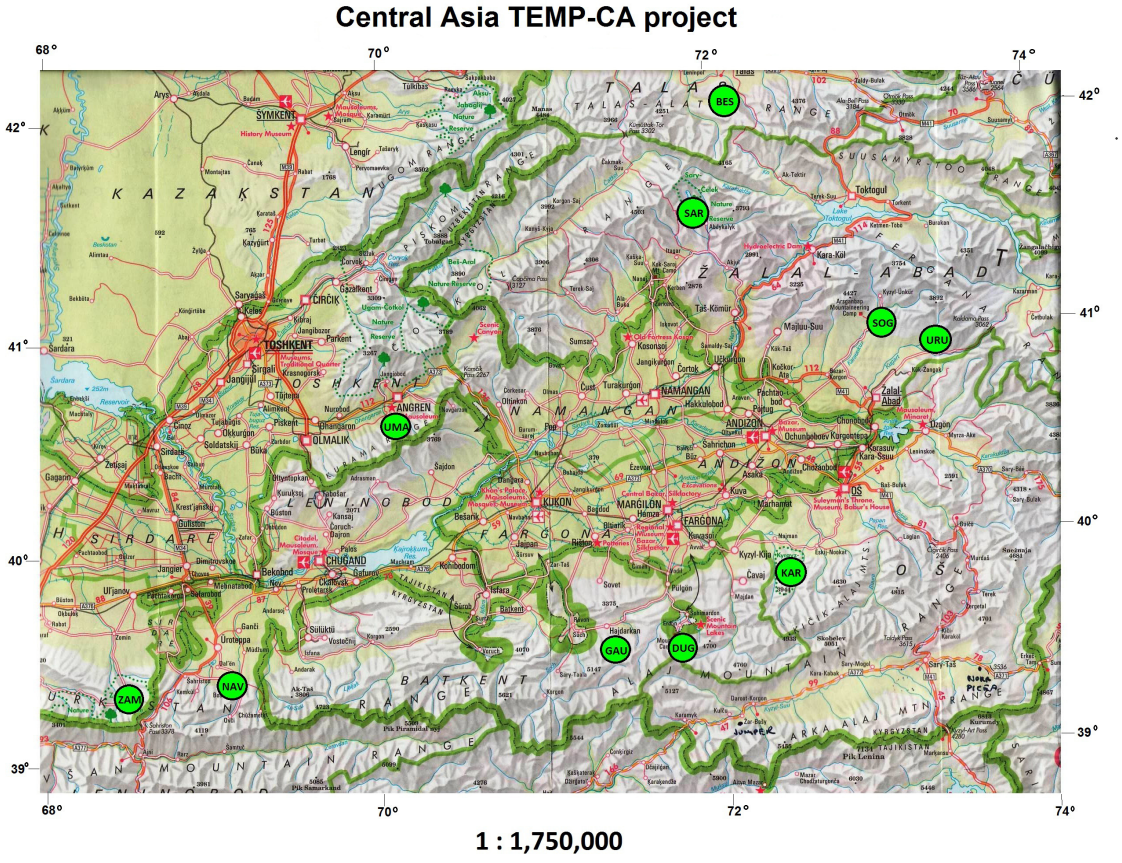

Fig.1: Map of the 10 TEMP-CA monitoring reference areas.

As many of the monitoring sites are situated in and around the Fergana valley it will be possible to use these reference areas to follow the development of the environmental status and challenges of this area, including the surrounding mountainous areas.

The Fergana Valley has, both in historical and present times, been of importance for food production, transport and habitation. The old silk route went through the area, which connected Europe with China. During ages high developed societies could develop in the area.

Also today the Fergana Valley is of crucial importance for the food supply of the whole region. In the area vegetables, cereals, grass, fruits and cotton are produced.
The water for agriculture and human consumption is coming from the mountains. Water supply is fully depending on well functioning irrigation systems.

The mountains surrounding the Valley are high and difficult accessible. This is the reason why the Fergana Valley also is important for habitation and transport.

The Fergana valley lies in different Central Asian countries: Kyrgyzstan, Kazakhstan, Uzbekistan and Tajikistan. After the collapse of the USSR many of these countries do have disputes about land, water and other natural resources. There are also several political tensions in the area. Due to this situation free transport of persons and goods is to some extent hampered and in some border areas crossings are very limited.

The mountainous areas around the Fergana Valley are rich in minerals and have many old and still existing mines. Examples of mined minerals are mercury, strontium, antimony, lead, uranium and others. Both old and present mines are often a source for contamination. Also local industry can be a source for air pollution. The area is tectonic very active and heavy earthquakes are common in the whole area and cause regularly many victims (Dushanbe, Tashkent).

The collapse of the USSR had negative effects on the infrastructure in the Fergana valley. However between the different countries differences exist. In many parts infrastructure is now being strengthened but it is a huge gap to fill to have a well functional system. Poverty of the population is a problem and many farmers don't have the money to invest in agricultural equipment, pesticides or fertilizers. Income from agriculture is directly needed to survive. Undernourishment is in some places a problem. Also water born diseases like diphtheria, worm infections, typhoid, amoeba, E-coli, Hepatitis A are regularly a problem.

During the 20th century deforestation was increasing, both for producing timber and getting more grazing land. This deforestation contributed largely to increased land degradation. Nowadays on several places around and in the Fergana Valley efforts are made to increase the forested area (Figure 2).

Fig. 2: Forest planting in Tajikistan. Picture: Arnold Arnoldussen

Overgrazing in the areas within and around the valley is a big problem. Due to the fact that farmers directly are depending from income from agriculture the stocks of cattle (sheep, goats, horses) are much higher than the ecosystem can bear. Extensive soil erosion and land degradation can be seen in many places. Today, large areas are affected by soil erosion and land degradation. More than 50% of the 10.6 million ha of arable land in Kyrgyzstan is affected by soil erosion. Landslides are in many regions a common phenomenon and there are yearly casualties. A consequence of these land slides is also that valuable agricultural land is lost and buried by stones and debris.

As mentioned the Valley is depending on water supply from the mountains. Already from historical times ingenious irrigation systems were developed. Today in many places the maintenance of these systems is too bad and on many places irrigation systems have collapsed. As a consequence salinization of agricultural land is common and also part of the agricultural area suffers from lack of water.

In soviet times all agricultural land was collectivised. After the breakdown of the Soviet Union a privatisation of agricultural land started, but this process has been very slow - in some countries it is hardly started. Through this privatisation process there is a need for establishing land information and cadastral systems. International support is given to build up these systems.

During very long times of isolation of the mountain areas in and around the Fergana valley endemic species could develop. Many of these species are depending on a certain land management. Both intensification (overgrazing) and land abandonment can threaten biodiversity and the existence of these species.

The Kyrgyz Environment Action Plan (NEAP) identified five major areas of concern:

- Inefficient water resource management;
- Land degradation, mainly due to overgrazing;
- Overexploitation of fragile forest resources;
- Threat of irreversible loss of biodiversity; and
- Inefficient mining and refining practices.

2. ENVIRONMENTAL STATUS AND CHALLENGES

The environmental status and challenges can be divided in the following topics:
- *water supply*
- *land management issues including biodiversity*
- *contamination by mining and industry*

2.1. Water supply

Agriculture and food production in the Fergana Valley is dependent from the water from the surrounding mountains. The water is received from glacier systems, melting snow and aquifers. The water is transported via ingenious systems to the agricultural land (Figure 3). So called water boards divide the water among the different farmers.

Fig. 3: An irrigation system from Talas, Kyrgyzstan. Picture: Arnold Arnoldussen

During the Russian era the original irrigation systems were replaced by systems made from concrete (Figure 4). The last decade's maintenance of the irrigation systems has been badly resulting in collapse of the system in many places and again resulting in salinization, water shortages and erosion/land slides due to water leakage. Salinization occurs when water containing certain levels of salt is used for irrigation (Figure 5). The water is evaporating fast and the salts in the water crystallises in the topsoil. At the end salinizated soil is unusable for agricultural purposes and restoring the situation is a long and difficult process.

Fig. 4: An irrigation system made from concrete (Tajikistan). Picture: Arnold Arnoldussen

Fig. 5: Salinization (Uzbekistan). Picture: Arnold Arnoldussen

Besides the maintenance of the irrigation systems 3 other water related challenges are actually in the area:

1. Both in Kyrgyzstan and Tajikistan water from the mountains is used for the production of electricity. The barrier dams are during summer time filled with water, which is used to produce electricity during winter time, when the need is biggest. This means that less water is available for irrigation of the downstream areas. Here the need for water is biggest during summer time.
2. Especially in Uzbekistan the area for cotton and fruit production is increasing. The need for irrigation water is therefore increasing. At the end of river systems there is already too little water, e.g. resulting in the Aral Sea problems. The water level in the Aral Sea has decreased tremendously and the dried shores are salt. The salts are transported by wind to active agricultural areas and oppose a threat for agriculture. In Uzbekistan and Turkmenistan afforestation programs are established to build up a barrier for this salt transport.
3. Climate change causes increased smelting of the glaciers in the mountains and it is expected that in the next decades many glaciers will disappear. As a consequence the sources for the water supply will disappear resulting in an increased and structural water shortage.

At present time water shortage is already a problem due to the above mentioned factors and tensions between the different countries is a fact. To reduce the problems in future irrigation systems should be repaired and modernised and agriculture should introduce more efficient irrigation systems at field level. Water boards should be developed everywhere and institutionalised. The countries in between should in due time develop and agree upon a common water policy.

2.2. Land management issues including biodiversity

The hills and mountains around the Fergana valley are extensively used as grazing land. In general there are few restrictions for grazing animals on common lands. Even in most national parks and forests grazing is allowed or occurs even when forbidden, like in one of the TEMP-CA monitoring sites Kara-Koi. Grazing animals include sheep, goats, cattle and horses.

In many places the amount of grazing animals outreaches the ecological capacity of the land. The result is erosion and land degradation on a large scale (Figure 6). In the TEMP-CA project 3 monitoring sites were established in National Parks in or close to the Fergana valley (Kara-

koi - Kyrgyzstan, Sary Chelek – Kyrgyzstan and Zaamin– Uzbekistan) were grazing animals are forbidden during a shorter/longer time. The effect on vegetation development and erosion features was clearly seen (Figure 7).

Fig. 6: An overgrazed area in Uzbekistan. Picture: Arnold Arnoldussen

Fig. 7: Encroachment in Sary Chelek National Park (Kyrgyzstan). Picture: Arnold Arnoldussen

Overgrazing may lead to an increase of the risk for land slides occurring during events of high precipitation and during snow melting.

The amount of grazing animals should be brought balance with the capacity of the land and the grazing quality of the vegetation. Here comes also in the element of biodiversity. A certain level of grazing secures the development of biodiversity rich biotopes. Banning out all grazing will lead to an encroachment with trees/shrubs and typical mountain vegetations containing a lot of bulbous plants will disappear. In the TEMP project the area Gauyang is an example with high biodiversity in combination with grazing activity (Figure 8).
Protection of biodiversity in and around the Fergana Valley gets an extra dimension as many endemic species could develop in the mountain areas – it can be considered as a world in heritage. In many TEMP monitoring sites these endemics were found. Securing grazing activities at a certain level will help to protect these species. Both intensification of grazing and land abandonment will threaten the existence of the established population. Also farmer communities are dependent from income from grazing. Alternative sources of income should be arranged before grazing activities will be limited or in some areas forbidden.

Fig. 8: An area with a high biodiversity value (Gauyang, Kyrgyzstan). Picture: Arnold Arnoldussen

Systems for land evaluation should be developed to evaluate the quality of the grazing lands and the thresholds for grazing densities (see chapter 3).

The flat lands of the Fergana valley are used for a variety of agricultural crops: e.g. vegetables, grass, cereals, fruits, mulberry (silk) and cotton (Figure 9). Due to the economic situation the degree of mechanisation is very low. Also the use of fertilizers and pesticides is limited. Increase of the level of mechanisation and modern technology will over time contribute to an increase of the food security and economic situation of the farmers. Challenge for the area is preventing salinization and the supply of enough water of a good enough quality.

Fig. 9: Agriculture in the Fergana Valley. Picture: Arnold Arnoldussen

2.3. Contamination by mining and industry

The industrial sector of the Kyrgyz Republic is dominated by mining and metallurgy, which make an important contribution to the economy. Mining alone contributed about 21 per cent of GDP in 1999. Kyrgyzstan has substantial coal deposits, two significant gold deposits and many medium and small sized ones, as well as deposits of mercury and antimony, marble quarries and mineral resources used in the ceramics industry. There are also rich tin and tungsten deposits as well as other polymetallic elements. Many of these mining and processing facilities are producing at reduced levels or are closed due to decreased demand for these metals in Russia and the Federation of Independent States (NIS), production problems, obsolescent technology and/or exhausted deposits. Antimony and related products are produced at the Kadamjai Metals Combine, and mercury is distilled at the Khaidarkan plant in Batken Oblast.

Mining industry forms the greatest industrial threat to the republic's environment. Mining dumps and tailings are badly maintained (Figure 10 and 11). As a consequence heavy metals and toxins are leaking into the rivers and other watercourses, which are used for agricultural purpose in the Fergana valley where it finally reaches the Aral Sea. The Fergana Valley is one of Central Asia's most densely populated agricultural and industrial areas. Cotton fields, orchards, walnut groves, and mulberry tree plantations (for silk) cover the region, which is one of the world's oldest cultivated areas.

Fig. 10: Tailing in Khaidarkan (Kyrgyzstan). Picture: Rolf Vogt

Fig. 11: Tailing in Khaidarkan (Kyrgyzstan). Picture: Rolf Vogt

A separate threat is the old uranium mines in and around the Fergana valley. On this moment all uranium plants are abandoned but the tailing materials still offers a threat for both population and environment. In Majluu Ssuu (Kyrgyzstan) the tailings are covered with a protective soil layer. But here potential landslides offer a threat that the radioactive waste is transported to the river and offers therefore a threat for the downstream situated agricultural areas in the Fergana Valley. Other old uranium plants are only fenced, but the radioactive dust can be transported from the area by wind. Internationally there is focus on these threats and support is given to reduce the level of danger (OSCE).

During the TEMP project an assessment of the environmental situation was done in and around the Antimony mine in Kadamjai and the Mercury plant in Khaidarkan. A Master Student at UiO - Kristine Solberg - got her Master's degree in June 2009 based on her thesis: "Heavy metal levels and mercury speciation in water, soil and sediments in a highly contaminated mining area in Khaidarkan". It was concluded: "Khaidarkan is a heavily contaminated area. The levels of Hg and Sb are especially high due to the activity of the Khaidarkan Mercury Plant (KMP). The levels of other heavy metals are also high; Cd and As are found in amounts significantly above background values. Pb and Zn were also found in elevated levels in some of the samples. KMP is likely the main source of these metals as well. This is indicated in a PCA analysis were Cd and As along with Pb and Zn were clustered together with Hg and Sb".

Generally the tailing material offers a threat for both environment and population because:

- Many old mines are abandoned and the existing tailings are not longer managed. Transport of the pollutants to the surrounding environment is possible by wind (dust), by surface and ground water streams and by disasters due to earthquakes. Central Asia is exposed to heavy earthquakes. An earthquake may cause a breaking of a dam or causing a landslide.
- Still working mines don't have the financial capacity to invest in modern technology and in measures to reduce environmental impact of their industry. Working situation of many labourers in the industry is bad and for example higher mercury levels in the population of Khaidarkan are reported.

Solving the problems caused by existing and old mining industry is already signalised as a priority (OSCE) and several actions are taken. But the extent of the problems is that big that more efforts are needed. As the financial position of the involved countries is low additional international support is mostly needed.

3. SOLVING THE ENVIRONMENTAL PROBLEMS IN AND AROUND THE FERGANA VALLEY

As described earlier solving the environmental problems in and around the Fergana Valley is a huge task. The environmental issues are related to other important areas like socio economic position of the population, welfare, health, organisation of cadastral systems and food production.
A structural approach is therefore needed and the effect of the measures will increase when the involved countries cooperate with each other.

The following actions may contribute to the solution of some of the environmental problems:

- Developing and implementing a system for inventory of natural resources and land use
- Further development of a monitoring system like the sites established in TEMP-CA and following up the existing monitoring plots
- Follow up of the threads caused by tailings from existing and old mines.
- Improving agriculture.
- Institutional and capacity building, and education of farmers and land managers.
- Development of legislation

3.1. Developing and implementing a system for inventory of natural resources and land use.

Many of the land management problems are related to land resources. To improve the land management situation it is needed to develop and implement systems for inventory of natural resources including land use. As these systems are actually for many countries it is needed to use existing approaches and modern technology to reduce cost level.

The following inventory systems for natural resources need to be developed:

- a land use inventory
- an inventory of soil quality
- a forest inventory
- establish a net of monitoring plots in reference sites like in the TEMP-CA
- new investigations of plots in the established monitoring sites for identifying impacts of pollution, climate change and grazing and use these monitoring sites as reference for other, more heavily polluted and exploited areas

A system for land use inventory gives an overview of the most important land uses in the Fergana Valley, their extent and where they are situated. In the inventory need to be included the extent of eroded/degraded areas due to deforestation, salinization and overgrazing.
A detailed mapping will take long time and will be costly. With modern technology based on satellite images and/or aerial photographs combined with a calibration on the ground a faster inventory can be done at a scale around 1:250.000. Data about the land use and land management situation can be used to develop and implement measures to improve agriculture and to solve land management related problems (erosion, degradation etc).

An inventory of soil quality is needed to plan the development of agriculture. Based on data on soil quality it will be possible to plan the right crop in the right place. The ultimate objective of the soil mapping is the establishment of a soil information system covering the Fergana Valley. This soil information system will contain data on soil quality and derived information on land capability and the risk for important soil threats like salinization and erosion. The establishment of a Soil Protection Service in the involved countries is advisable.

The soil mapping should be done based on modern technology and eventual existing data should be included if possible. Internationally research is going on to implement new technology in soil mapping activities. Based on both data about soil quality, land use and degradation status measures can be developed and implemented to reduce land degradation. Measures may vary from forest planting, reducing life stock or change in crops or cropping systems.

On this moment information is generally lacking about the amount of forest and its status. Development of a system for forest inventory and its implementation will give information about the forest status, standing wood volume and its development. Existing forest inventory systems, used in a number of countries, are based on monitoring sites which are visited regularly (every 5 – 10 years). Development of such a system for the Fergana Valley could be based on modern technology and information collected by satellites.
Data from a forest inventory is to be used to develop national forest policies, to plan production of firewood and to plan forest planting in degraded areas.
In the involved countries there are discussions about allowing/introducing private forest ownership.

With the development of TEMP based monitoring reference areas it is important to secure durability over time. This will only be possible if a national organization gets the responsibility for further development, implementation, maintenance and reporting of the results. A developed monitoring system should be part of a national policy on the protection and development of the national natural resources and should contribute to the reduction of environmental problems.

3.2. Follow up of the threads caused by tailings from existing and old mines.

Concerning contaminated sites activities are needed to remediate the pollution. Also in developed countries the involved costs for such remediation is that high that it is chosen to implement measures which isolate the contamination. Extra measures are needed in areas susceptible for earthquakes. The measures should be combined with monitoring systems monitoring the spreading of the pollution by wind and water as well as monitoring effects on forest ecosystems and other ecosystems.

There is a need to have a national register giving information about the geographical position of the contaminated sites, their characteristics and their status for remediation/monitoring. The established TEMP sites can be considered as “clean” of anthropogenic pollution. As they are situated around the Fergana valley they can be used as reference sites. As a follow up activity of the TEMP – CA project an application was sent to cover this element (TTP – TEMP Tailing project: Environmental Safety Studies and Improvements of Tailing Deposits in Batken Oblast, Kyrgyzstan).

3.3. Improvement of agricultural production

After the collapse of the USSR system the agriculture sector was hampered, technically and due to more difficulties in exporting agriculture products. The level of mechanisation decreased tremendously and generally all work is done manually or with the help of an ox. The availability of pesticides and fertilizers is limited, also due to the fact that farmers cannot afford them to buy it.

In many places the irrigation systems are in a bad condition or have even collapsed. Modernisation and reparation of the systems is needed. Implementation of modern irrigation techniques should be foreseen in future, but this requires first that farmers do have possibilities to invest in these techniques. Research should be established to develop irrigation systems adapted to the situation in Central Asia.

Trees and shrubs needed for reforestation and reduction of land degradation are in many places gathered from nature. Development of private nurseries is a possibility which should be considered. Knowledge at universities and agricultural schools how to do this should be developed.

In developing agriculture and stimulating the increase in a sustainable food production the development of a system for agricultural education and extension services is obligatory. In sustainable agriculture the implementation of modern techniques like Integrated Pest Management is needed. Some developments are already achieved in this direction (Academy of Sciences, Tashkent).

3.4. Capacity building and education

After the collapse of the USSR system many leading researchers in Central Asian countries went back to Russia. On this moment many fields of education lack both knowledge and capacity. Salaries at universities are often very low, so people are forced to find second jobs outside university.

When solving the environmental problems, described above, it is needed to build up educational systems with both capacity and knowledge in the different fields. For agriculture it is important to teach the teachers. The knowledge level of farmers need be increased (Figure 12). This is both done by establishing a good extension service and a good system for agricultural education.
Knowledge of the biodiversity in the area is generally lacking. The TEMP – CA project learned that there is much to gain here. The established monitoring sites learned much about the present species. A general experience is that existing number of specialists is too low. New specialists should be educated and focus should be brought on describing biodiversity in the area.

Fig. 12: Education in forestry management (Tajikistan). Picture: Arnold Arnoldussen

3.5. Development of legislation

A durable development in environmental protection and agriculture can only be guaranteed when all the (technical) measures are supported by an adequate legislation. This legislation is not only needed to describe the duties, but it describes also the rights of the local population. It is very important that legislation is developed in a good understanding with the local population. In the case measures/legislation is reducing the possibilities for the local population it is central to develop alternatives for income for the local population before the implementation of the measures.
Fields for necessary new legislation are possibly:

- Cadastral systems and registers.
- Forestry and land use.
- Agricultural development and prevention of land degradation.
- Protection of biodiversity.

4. SPINOFFS OF THE TEMP-CA PROJECT

The TEMP-CA project had as objective the establishment of environmental reference areas in the Fergana valley. In total 10 sites were established in Kyrgyzstan, Tajikistan and Uzbekistan. In one additional site in Uzbekistan, established in the Forest Damage project, the same methods for recording vegetation, trees and soil in monitoring plots were established, but in addition, insects and fungi have been recorded in the area. The TEMP-CA project had also a strong institutional, competence and capacity building aspect and cooperation was established with the different Academies of Sciences and between scientist in different institutions and different countries in Central Asia.

This phase of the TEMP - CA project will be closed at the end of 2010. Based on the different experiences, many described above, the following spinoff effects can be mentioned:

1. Agriculture in the Fergana valley is fully dependent on enough water supply from the mountains. We see that both the need for water is increasing and that the future water supply from the mountains is decreasing due to climate change. All water coming into the Fergana Valley runs into the Aral Sea. Already many years the water level in the Aral Sea is decreasing and dramatic changes did happen. Large areas of the Aral Sea dried up and the dried bottom is full of salts, which is transported by the wind to the agricultural areas in Uzbekistan and Turkmenistan. Authorities from Uzbekistan and Turkmenistan plan to plant a protective forest belt of Black Saxaul (Haloxylon aphyllum) to stop the spreading of the salt into cities and agricultural areas. The Norwegian Forestry Group (NFG) developed a project proposing the monitoring of the development of these plantations. This to improve the knowledge which factors influence the development of this shrub.

2. As described above polluted tailing areas from old and existing mines offer a threat to agriculture, environment and population in the nearby and far off surroundings of the tailings. It is important to isolate the pollutants and prevent leakage to the local environment both as a gradual process or initiated by a sudden incident like an earthquake.

The NFG developed a proposal to mitigate the danger from some tailings in the Batken Oblast. This proposed project will reduce the threat to agriculture and the local population in a large part of the Fergana Valley.

3. The TEMP-CA project established terrestrial environmental reference areas around the Fergana Valley. Objective is to be able to follow the influence of land use change, natural development and aerial pollution and climate change on terrestrial ecosystems. In the first phase the focus was on capacity building. In the second phase it is important to include these reference areas in systems for environmental monitoring. This system has to be anchored in national activities organized by national authorities responsible for the environment. NFG has developed, together with the University of Central Asia (UCA), a proposal to establish a Central Asian Mountain Monitoring Network (CAMMoN). It is a regional effort initiated by UCA to develop existing monitoring systems and data, and establish much needed additional systems to create a comprehensive, regional monitoring network to collect and make critical data available to stakeholders across the region and the globe.