



*World Bank Technical Paper*

*Work in progress for public discussion*

*Europe and Central Asia Environmentally and Socially Sustainable Development Series*

# KAZAKHSTAN

*Forest Sector in Transition:  
The Resource, the Users and Sustainable Use*



*Andrey Kushlin  
Tjaart Schillhorn van Veen  
William Sutton*



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## EXECUTIVE SUMMARY

### *The Resource and the People*

*Kazakhstan is a large country with limited forest resources* relative to its overall land area. Forests areas account for a mere 4.2% of Kazakhstan's territory. However, the 11.5 million hectares of forest cover still make Kazakhstan the third largest forest country in the Europe and Central Asia (ECA) region, after Russia and Turkey. In the traditional measure of forest abundance – total growing stock of timber – Kazakhstan with its 383.7 million m<sup>3</sup> of standing timber ranks low compared to other ECA countries (only one-third of Romania), although in the same league with South Africa, Vietnam or the Philippines. Its limited forest production on the major part of Kazakhstani territory is partly a result of the desert climate and low precipitation.

At the same time, *Kazakhstan is a nation that considers its forests important*. Both forests and population have average low densities and are distributed unevenly over the country's territory. On a per capita basis, Kazakhstan has almost as much forest land (0.77 ha/person) as the 'forest-rich' United States or Malaysia and is significantly ahead of most ECA countries (except Russia, Belarus and the Baltics). The main concentrations of forests and people in Kazakhstan are in the fertile forest-steppe zone extending to the south from Russia along the northern border; at the foothills and slopes of the Altay, Alatau and Tien Shan mountains along the eastern and southeastern borders; and along the Syr-Darya and other main rivers. 2.5 million people live in or near woodlands. About 300,000 people are directly dependent on the forestry sector. They use forest for food and fodder, shelter and construction materials, fuel, commercial activities, recreation, etc. The forest performs such important functions as wind and soil erosion control, water retention, agricultural land productivity (shelterbelts). These functions justify public management for protection and reforestation and afforestation of forests in Kazakhstan. Kazakhstan is a middle-income country which recognizes the multi-use functions of its forests. This approach is shared by the Government as expressed in the recent statements by President Nazarbayev and a visible increase in the funding for forest management since 2001.

*Different forests – different problems*. Because of the diversity of landscapes, Kazakhstan can be regarded not as one forest nation, but as several forest domains that are separated in the geographical sense by the vast treeless space of central and western deserts and semideserts. They are: the *Altay Mountains* (home to unique Siberian biodiversity and also a concentration of 75% of commercial-grade spruce and fir timber in Kazakhstan), the *northern forest-steppe* (with birch, aspen and pine forest islands fragmented amidst farmland – an important source of water retention, local construction material and fuelwood, as well as a key habitat for wildlife); the *Irtysb* relic pine strip forests; the *Tien-Shan Mountains* (a globally unique habitat in terms of agrobiodiversity, wild nut and fruit production, a critical water source for the Aral Sea and Lake Balkhash, and an internationally important tourist destination), and the *saxaul scrub forests of the southern desert* (a source of high-quality fuelwood and a critical habitat for livestock grazing and sand dune control near the Aral seabed). In addition, there are *riparian forests* along major rivers. They play an important water-protection and water-regulating role. In the southern floodplains there grow tugay forests. Lastly, there are man-made *agricultural shelterbelts* on farmland and shrubs on under-utilized pastures across the country, which have been recently reclassified into forestland to avoid a management vacuum.

### ***Threats***

The generally dry extracontinental climate of Kazakhstan makes the existing forest ecosystems particularly susceptible to various threats, including:

- aridization/desertification
- fires (natural and anthropogenic, including agricultural fires)
- pest infestations that often follow fires
- overgrazing
- dropping water tables
- overharvesting through illegal and “sanitary” cutting, and through increased subsistence cutting for fuelwood
- forests degradation from excessive recreation use (hunting/tourism).

The importance of each of these threats varies by region, as explained above.

### ***Institutions and Management Regime through the 1990s***

Since its inclusion in the Soviet Union, all forests in Kazakhstan have been, and continue to be, owned by the state. According to the current legislation, lands of the forest estate, flora (including forests) and fauna, as well as the protected areas, may not be privatized. During the Soviet period, there was a strong tradition of centralized public forest management and the Government was in charge of both management and utilization of forests. Because the local wood-based industry was dependent on subsidized imports of timber from other parts of the Soviet Union, forests in most of Kazakhstan (except for the forest-rich areas in the East) were primarily managed to strengthen the protection and recreation. Collective and state farms were in charge of managing agricultural forests and shelterbelts and much of the saxaul woodland that was being used for grazing. Over 10% of forests were man-made plantations.

Currently the Forestry and Hunting Committee is managing almost all forests and protected areas of Kazakhstan. It employs 7,000 staff at the headquarters and in 14 regional and 138 district-level offices (down from 25,000 staff in 1990). A small percentage of forests is under management by the Presidential Administration and the Academy of Sciences. Since independence and economic transition, wood-based industry was privatized and has mostly collapsed. With the demise of most collective and state farms, the management of most saxaul and agricultural forests have been transferred back to central management, but a legal vacuum exists at a local level. Public funding of forest management and environmental protection in Kazakhstan have dramatically declined in the 1990s, and has been among the lowest in the ECA countries, averaging US\$0.5 per capita per year. Most of afforestation and forest inventory and protection works came to a virtual standstill by the end of the 1990s. Kazakhstan’s forests suffered dramatic losses from fire in 1998, affecting as much as 10% of the forest area.

In the late 1990’s, the forest management agency went through several reorganizations that sought separation of management and oversight functions. With recent recovery of budgetary performance, public funding for forest management is gradually improving. Multiple changes in the institutional setup have resulted in gaps and overlaps in key forest management functions. Forest resource information and analysis is substantially outdated, so no proper forest management can be planned. The forest sector suffers from a major human resource drain, there is a lack of new required skills (extension, marketing, public participation). There is a need for additional measures to prevent corruption and other governance problems and improve economic incentives. Strategic decision-making suffers from a lack of public involvement. The nationwide forest reform agenda has been overly driven by powerful industry interests from only one region in the East which should not automatically apply to all other regions. The government needs to improve its policy framework to allow differentiation of forest management systems by region, gradually delegate clearly defined functions to regions and districts, and develop extension capabilities for divestiture of certain forest management responsibilities to communities, farmers, and the private sector.

### ***Recent Developments in Government Strategy***

The Government has been revisiting its policies in environmental and natural resource management. It initiated the preparation of the *National Environmental Action Plan* (NEAP) for the republic in 1997, with assistance of the World Bank, the United National Development Programme (UNDP), and the European Union's TACIS Programme. The result is a comprehensive environmental action plan, which the Government uses as a blueprint for its future environmental actions and investments. The NEAP has identified seven key priorities problems that include, among others, degradation of pastures and arable lands (most acutely manifested in the south) and lack of forests and protected areas as natural habitats (particularly important in the northeast). In particular, it proposes support for extension of forest areas for restoration and conservation of biodiversity, improving fire management in coniferous forests in East Kazakhstan, organization of environmental and resource monitoring of forests, and new forms and ways of participation of land users (farms, communities) in activities on land transformation and improvement.

The World Bank has supported the Government during 2002 in further defining priority actions and in improving the Forest Code (new version approved in 2003) that should provide the legal and regulatory basis of the fundamental reforms taking place in the forest sector. Another important change has been the transfer of the Forestry Committee responsibilities from the Ministry of Environment to the Ministry of Agriculture in September 2002, which is a reflection of the changing role of forestry and forest management. Among the priority *actions recommended* in the joint World Bank – Kazakh study are:

- Develop and adopt a new long-term vision for sustainable use, increased productivity and enhanced conservation of forest and associated rangeland resources, and a strategy to reflect change of paradigm with more rights and responsibility to local decision-making (oblast, rayon, community, private), and specific provisions for transition period – with emphasis on pilot activities and phased implementation.
- Allow management objectives and systems to differ by region – e.g. 'concession' model now strongly advocated by industry interests in the East should not be automatically applied to all country. The Forest Code should allow multitude of management systems, including concession management in the East, direct management in the North, use-contract management by public district entities or communities in the Center and the South (i.e. in areas where rural population densities are sufficient).
- Develop pilots for conceded management of forests, e.g. by private entity through a long-term lease or concession contract. The latter to be likely limited to a few forests in the east (Altay), with appropriate technologies and compliance with environmental and forest management standards subject to independent third party forest certification.

The study *suggested that priority investments* in improved public forest management should cover the following areas:

- Substantial upgrades in the national and local capacity for fire and pest protection in order to reverse the trend in declining forest area (with gradual move to integrated pest and fire management).
- Rapid inventory of forest resource base, using landscape-ecological approach, preparing broad functional zoning of forest areas with adequate public participation (differentiation of management systems mentioned above should follow this zoning process).
- Substantial upgrades in the local (including community and farm) capacity for reforestation and afforestation in order to reverse the trend in declining forest area (with gradual move to developing private plantations on abandoned farmland).
- Training for central and local forestry staff, especially in economic analysis, marketing policies, extension, public and community participation.

*In response to the study*, the Government has endorsed: (i) the emphasis on protection, after the excessive forest loss during the transition; (ii) the need for public services in forest protection such as fire protec-

tion, pest control and monitoring; (iii) the acceptance that forest management can be decentralized, albeit with some clear national rules; and (iv) the acceptance to explore private forest ownership especially of newly created plantation forests. These positions are in agreement with the World Bank's Forests Policy and with ECA rural development policy.

## PART 1. INTRODUCTION

- 1.1 In October 2001 the Government of Kazakhstan, in a letter to the World Bank, indicated it would focus in its joint program with the Bank on issues relating to rural development, water, environment, forest rehabilitation, and protection of natural areas. The Government considers these areas not only economically, but also socially important and one of the essential components of its poverty reduction program, with possible borrowing of up to US\$150 million in these sectors.
- 1.2 Kazakhstan is a forest poor country and by percentage of forested land (4.2%) ranks one of the lowest in the world. Of 11.5 million hectares of total forested land 7.8 million hectares, i.e. almost 70% are saxaul and shrub associations (sparse growth of trees) of the desert zone, while forests of coniferous and deciduous species have the area of only 3.7 million hectares. All forests provide habitats to globally important biodiversity and play an important role in land, wildlife and watershed management, and tourism, and besides they are the source of timber. They are a key factor in protecting the watershed of the Aral Sea and Lake Balkhash, and play a role in reducing desertification and siltation of waterways and reservoirs. About 300,000 people are directly dependent on the forestry sector, while an estimated 2.5 million live in or rely on the forests for fuel wood, fodder and other forest products. Almost 10% of all forests in Kazakhstan are plantations established in the Soviet period for wind erosion and sand control in agricultural lands. However, this precious resource has been subject to increased degradation in the recent years of political and economic transformation. The main factors have been increased incidence and areas of fires, unauthorized cutting, overgrazing, decreased water tables, development of agricultural land, desiccation of riparian forests, as well as pests and diseases.
- 1.3 The Bank responded to the Government's request by fielding a mission to assist in the development of a program and policies to protect the most vulnerable Kazakh forests that were recently decimated by forest fires and illegal logging.
- 1.4 A joint fact-finding exercise was initiated and a number of technical experts were requested to draft brief reports on some of the major issues in the forestry and rangeland sector. The main objectives of the study were:
  - (i) to provide to the Government of Kazakhstan and national stakeholders an initial assessment of options for collaboration in the forest sector and the focus of support that is likely to have the greatest benefit; and
  - (ii) to inform the management of the World Bank and other donor organizations about key issues and potential for collaboration with the Government of Kazakhstan in a new sector.
- 1.5 These resulting technical reports were reviewed and discussed in a national workshop in Astana in June 2002. The workshop resulted in a number of policy recommendations which are summarized below. This current report was written to substantiate and elaborate on these recommendations, and is largely based on the technical input of the local consultant reports.
- 1.6 The structure of the report includes an overview of the current status of Kazakhstan's forest resource, its uses and users, issues in institutional setup and resource allocation, governance arrangements, and economic and financial flows in the sector. This is followed by an analysis of realized and potential forest values, and management costs that might be required for increasing these resource values and their sustainable contribution to economic and social development. The changing roles of the public and

private sectors, government agencies and local communities are described. Finally, a menu of options is presented for improvements in forest sector policies and management systems, followed by a prioritized list of possible public sector investments that could be supported by the World Bank in cooperation with other multilateral and bilateral financial institutions.

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## PART 2. OVERVIEW AND RECOMMENDATIONS

### A. Forest Sector Background

- 2.1 Kazakhstan is a land-rich and forest-poor country. Forests and shrubs occupy only 4% of its territory. The forests amount to 11.5 million hectares, they play an important role in land, wildlife and watershed management, wind erosion and sand control, and recreation. Area-wise, about 70% of all wooded lands is located in the south and southeast – mostly saxaul scrub forests that are important for fuelwood production, stabilize the vegetation and provide shade for animal grazing. The high mountain forests of the southeast and east (20% of area) have exceptionally high biodiversity, and recreational values, as well as nut and fruit production. The forests play a key role in watershed protection. Birch and pine stands of the northern forest-steppe fragmented amidst highly productive farmland serve as a major source of fuelwood and are important for wildlife and recreation. The west and center of the country is extremely arid and fundamentally devoid of forests. Volume-wise, over 80% of the nation's timber stock is in the north and northeast, half of it in the fir and pine forests of the East Kazakhstan Oblast where the bulk of the country's commercial-scale harvesting is concentrated. There is scope for commercial forest plantations of fast growing wood species in some southern areas, no longer used for irrigated rice production, but this activity is little developed as yet.
- 2.2 Since the 1970's, almost 97% of all forests have been classified as primarily protection forests with restricted cutting regimes, and two-thirds of them are totally excluded from any commercial timber harvesting. Traditionally, Kazakhstan was largely dependent on imported wood and wood products for industrial and consumer needs (mining, construction, furniture, paper). Most of the imports came from Russia. Since 1991 in Kazakhstan the total official timber harvest has decreased from 2.5 million m<sup>3</sup> to 0.9-1.2 million m<sup>3</sup> per year (compared with the annual allowable cut of over 2 million m<sup>3</sup>) and is now mostly used for local household needs (77% for fuelwood and 23% for sawlogs). The domestic wood-processing industry collapsed during the transition and wood imports have decreased. This was followed by a rapid increase in exports of unprocessed wood from Kazakhstan to China and Central Asian markets (66,000 m<sup>3</sup> legally and an estimated 200,000 m<sup>3</sup> illegally). Much of it is harvested unsustainably under the disguise of 'sanitary felling' of large areas of burned-over pine forests in the east. The collected forest and wildlife use fees and related taxes amounted to a mere US\$3.1 million in 2001, while forest management costs were US\$9.3 million.
- 2.3 A number of countries (including Sweden, Turkey, Romania and Georgia) have carried out a "total economic valuation" (TEV) of their forests – an analysis that takes into account watershed, vegetation and soil protection, biodiversity and carbon sequestration, and cultural and recreational values as well as timber and non-timber "production" values (see details in Box 3.4). This proved to be a valid approach in relatively forest-rich countries and helped policy-makers translate these values into a more adequate stream of benefits to society and better formulate important decisions related to the forest sector. Better accounting for non-wood and indirect use values would help forest management authorities in justifying a more appropriate budgetary share of financing for the public goods function of forest management. In the United States, which is comparable to Kazakhstan in terms of per capita forest cover,

revenues from non-wood uses of state forests (such as tourism and hunting) already make up a larger share of the total revenues of the US Forest Service. Indeed, Kazakhstan, with its modest volume of standing timber, presents an even clearer case where the non-wood values and services of forest ecosystems are probably much higher than its timber and direct-use values, and future revisions of forest sector-related policies and regulations should take these proportions into account.

## B. Rights and Responsibilities of Forest Owners and Managers

- 2.4 All gazetted forest land (26 million hectares of lands<sup>1</sup> that are designated for forest use and called the State Forest Fund) is owned and managed by the State. In principle, the central government, through the Forest Committee and its 14 regional and 138 local offices, has been responsible for managing 99% of these lands in accordance with regularly updated forest management plans. Like rangelands, forest land has not yet been the subject of land reform. In practice the regional and district governors (akims) have a large degree of control over land and resource allocation and use. Forest Committee activities are in principle financed by the central budget, and at local level include forest protection, management (including management for non-timber values), harvesting and reforestation. In practice only the north-eastern and south-eastern forests more or less continue to be managed in this way. Forest Committee staffing, budget and capacity deteriorated through 2000, but are now stabilizing. The challenge is to align new management practices to meet sustainability objectives in an environment where the local population has greatly increased access to forests but little accountability exists for their management, and where private sector activities are conducted with heavy regulation on the one hand, and poor governance on the other. Large areas of saxaul woodlands face a management vacuum although some user rights are allocated by local governors, and it is claimed that some forests actually managed by herders are less prone to over-cutting. These desert forests are rapidly deteriorating from over-cutting around towns and villages. There is also a management vacuum for the great majority of shelterbelts (around towns, along roads and railroads etc.) which had been maintained by the former state farms, but which, following land privatization and restructuring without clear guidelines for shelterbelt maintenance by new private owners, are deteriorating. Only the large shelterbelts continue to be managed by the Forest Committee.
- 2.5 **Ownership.** There is a multitude of forest ownership models around the world, with examples of good or poor performance under each model. More important is the basic principle that owner rights for resource use and disposal should always go along with responsibilities for resource management and restoration/protection. This principle should be in the law. Any provision for privatization or private management of forests should be accompanied by ensuring that there are adequately qualified and responsible private managers that can properly exercise publicly mandated resource management functions.
- 2.6 **Administration and Management Functions.** Whether forest management should be exercised by the central authorities, oblast akimats, local community organizations, or private farmer/leaseholders, is also a question without one simple answer. Different functions can be assigned to different subjects, depending on geographical and socioeconomic context (see Fig.1). The basic forest law should stipulate and enforce a few fundamental principles, whereby the distribution of forest management functions should be:
- (i) *comprehensive* – i.e. cover the full resource cycle from overall planning / regulatory / oversight to physical operations / restoration / infrastructure / processing / marketing. If any key function is

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<sup>1</sup> Of this area of 26 million ha, about 11 million ha is actually covered by forest. The remainder is degraded bush and rangeland.

overlooked, this creates loopholes and inefficiencies in management regimes. For example, the key function of approval of forest management plans and subsequent enforcement of their implementation is not explicitly listed in the current draft Forest Code

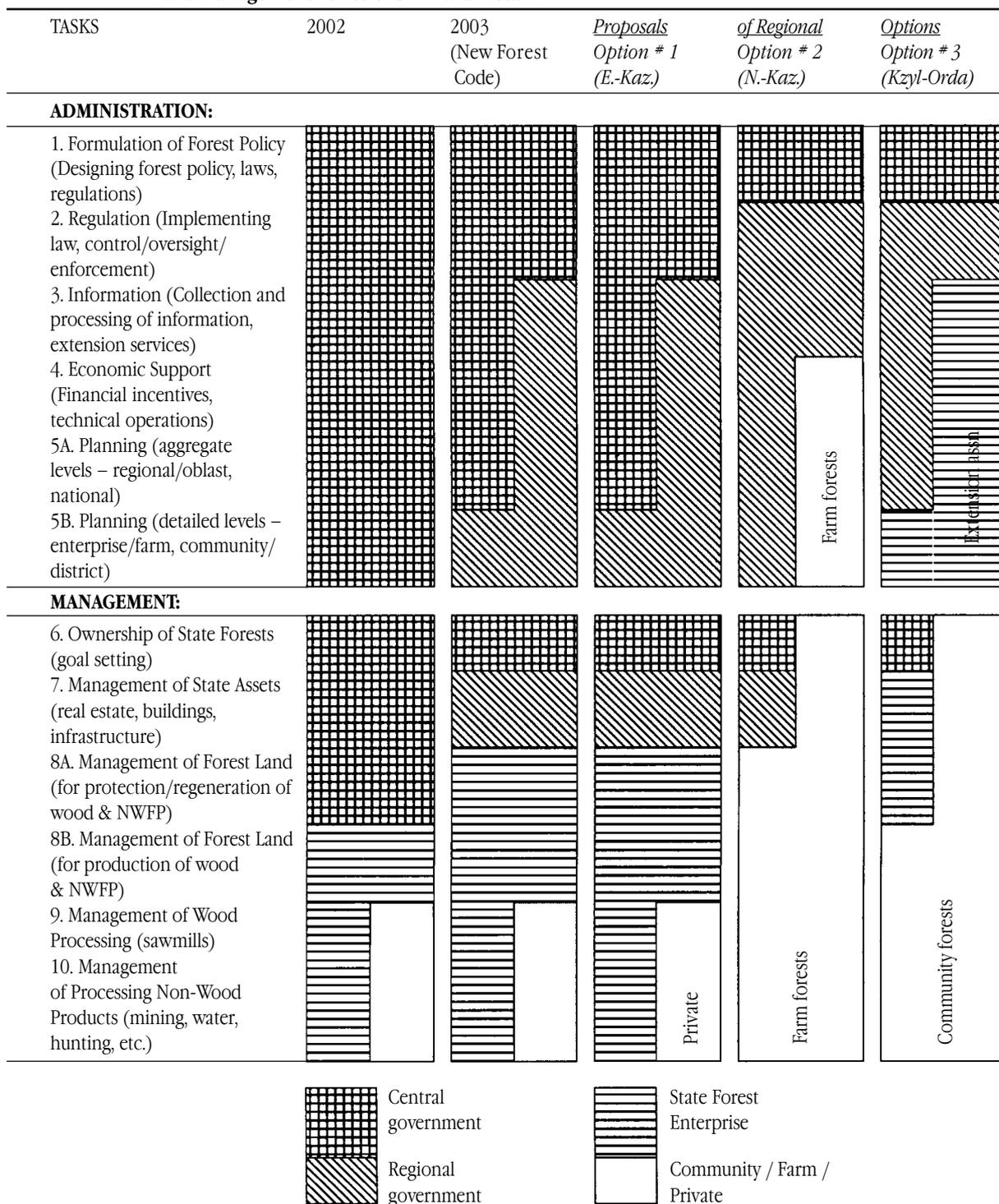
- (ii) *transparent* – i.e. avoid overlapping mandates and clearly separate between implementation and oversight to ensure accountability and transparency (e.g. implementation of the forest cadastre and monitoring in the Forest Code is assigned both to the territorial forestry oversight departments of the central government and to the local forestry units of the oblast akimats, which are now meant to be revenue-generating entities.) Worldwide, there is an overall trend for the public sector (the state) to move away from more management to more regulation, divesting management functions to the more flexible and motivated private sector. Such a trend is now particularly visible in the transition economies.
- (iii) *customized* – i.e. depending on the geographic and socioeconomic context (such as overall abundance/concentration or scarcity/patchiness of forest, population/farming density, environmental externalities, etc.) certain functions might be most effectively realized by public or private, central or local organization. For example ground fire protection in the Irtysh pine forest could be best suited for direct public management at a rayon level, while in northern birch ‘island’ forests it would work better through delegation to individual farms; thinning and infrastructure maintenance works in the remote Altay forests would be a more natural role for long-term private leaseholders, while the same role in the densely populated Tien Shan foothills or along the Syr-Darya valley in the South would be best played by, or contracted to, communal organizations.
- (iv) *efficient* – i.e. economies of scale should also be a key factor in the process of management function allocation, such as preparation of a forest management plan in accordance with centrally approved rules could in the Altay zone be easily handled by individual long-term leaseholders, but in saxaul forests or in patchy forest-steppe mosaics with mixed uses it should be implemented at a more aggregate landscape level by specialized rayon organizations.
- (v) *sustainable* – i.e. functional responsibilities should be accompanied by the economic means to carry these out – either by providing direct financing or fiscal incentives for implementation of public goods functions, or by granting the resource manager certain resource user rights for income generation. The direct financing scheme has been the primary arrangement under the centrally planned economy, and it would continue to be valid for those forests that must remain under direct public management (central or oblast) due to their prevailing public goods function, such as certain types of protected areas, roadside shelterbelts, etc. Physical activities related to forest management of such forests can be contracted out to private operators, but they should still be fully funded from the treasury. With some other forests, whose public-goods function is less critical, forest and land management responsibilities may be conceded (“leased out”) to non-governmental entities (private companies, communal or public organizations), in which case they should also be given the right (on a payment basis or free of charge) to use and sell certain forest products in exchange for an obligation to manage / protect / replant these forests.

2.7 Considering the above principles, organizational options for forest institutions in Kazakhstan should evolve towards diversification, and allowing enough flexibility to select a combination of options that would best suit the regional conditions. This should be done in a phased manner, first testing new arrangements on a limited scale as pilot programs. Another dimension of organizational change would be to move towards more decentralization. It can be started in specific forest types that are difficult to manage centrally (such as island birch forests in the north) and develop appropriate mechanisms for their local, communal or private management. Only forests of national importance should eventually remain under central management.

2.8 Options for addressing these issues include the following:

- In the east/north-eastern forests, management plans should be updated and the approach to management plan preparation revised. Management planning should move to a landscape approach, with detailed inventory only on production forest land. Local communities should participate in forest management planning, and district and regional governments should also be involved. Community forest management could be piloted in these areas, possibly

**Figure 2.1. Options for Institutional Distribution of Forest Administration and Management Functions in Kazakhstan**



through 5–10 year leases renewable conditional on meeting sustainable management criteria.

- In the southeastern mountain forests the focus should be on watershed management, again with community involvement.
  - In the saxaul forests the first priority is to carry out an updated resource inventory, and the second to institute a sustainable management regime (the age-class distribution is presently skewed as mature and semi-mature trees are over-harvested). One option would be to pilot land user associations (likely composed of farmers) which would have interest in maintaining the vegetation cover.
  - On agricultural and pasture lands, land use management regimes would need to be re-instituted for improved management of forest vegetation. One option would be to provide land owners with initial matching grants for shelterbelt rehabilitation, subject to an agreed maintenance regime.
- 2.9 Different institutional approaches to reforestation, including community participation and private contracting could be piloted as part of a proposed project. Some of the possible approaches for piloting are reflected as Options 1, 2, and 3 in Figure 2.1.

### C. Forest Valuation, Pricing and Financing

- 2.10 **Sources of Financing and Resource Pricing:** In forest-rich countries, such as Russia, Canada, or Brazil, economic values of direct (extractive) forest use typically exceed non-use (existence) values. This allows for the forest sector to be a net contributor to the country's fiscal systems. In such situations, forest sector financing systems are predominantly developed on the basis of non-tax resource rent payments (stumpage, royalties, user fees), with an addition of profit tax from forest industries and traders contributing to public revenues.
- 2.11 The efficiency of these systems depends on the adequacy of resource pricing mechanisms, which must be transparent, competitive and flexible. Russia, for example, has attempted to introduce such a system since 1993, but until now it has not worked well. The user fees were treated as a special centralized tax, which overcomplicated an already heavy tax burden on industry and pushed forest users into the unofficial ("gray") sector of the economy. The recently announced proposals to change the legal status of forest use fees to non-tax resource payments should increase the industry's incentives for a more market-based and transparent price competition at forest auctions and tenders, encouraging efficiency of wood harvesting and deeper value-added processing.
- 2.12 As Kazakhstan is, in absolute terms, a forest-poor country, it has a much higher 'public goods' function of forests, meaning that its non-use, existence values are higher than direct use values. The resource rent approach would have limited applicability, only in areas with significant local concentration of forest resources, such as in the Altay in East-Kazakhstan Oblast. A larger portion (up to 80%) of funding for forest management across the country would likely have to come from other sectors through the Treasury's redistribution of general tax receipts.
- 2.13 Indeed, Kazakhstan, as a middle-income country, can already afford to care about its environment, which has been confirmed in political statements by the country's top leadership. Government priorities are therefore aimed at preventing any further loss and degradation of the existing scarce forest and at expanding forest cover through reforestation and afforestation programs. The issue is now how to achieve this objective efficiently. By properly managing existing forests their important non-use values can be conserved and use values increased – through higher productivity, and a broader variety of multiple-purpose and indirect uses – which should lead to a growth in forest-related activities (especially non-timber products and tourism) and hence increase treasury receipt through direct taxation. Non-timber products include hunting and fishing, gathering of forest prod-

ucts (such as mushrooms and berries). Indirect benefits include reduced flooding and reduced soil erosion through adequate watershed protection. This logic should be followed in developing necessary justification and criteria for direct public funding of good forest management, including implementation of forest inventories and forest management plans, and targeted programs in forest protection and regeneration.

- 2.14 **Putting in place “the right” pricing mechanisms** for forest products, which would reflect a balance between the cost of harvesting and the market price on the one hand, and the replacement value and “public good” of the resource on the other, is a very difficult exercise, and policy makers all over the world have yet to find an “ideal” solution. Approaches include (for timber), using data on the price of imported or exported timber and estimating harvesting and transport costs as well as a reasonable profit margin. This “base” price would then form a reserve price; if forest resources designated for harvesting under a management plan are to be sold to private harvesters on a competitive bidding basis, and no bidder offers that reserve price, then the resource would not be harvested that season.
- 2.15 Revenues from sale of timber on state land are in some countries retained directly by the forest authority, in others are directed to the Treasury, with some revenues returned to the forest authority for forest management, and in others are allocated to local authorities on the understanding (often not observed) that sufficient revenues will be returned to the local forest authorities to allow for forest management.
- 2.16 The stumpage price regime in Kazakhstan is based on domestic timber prices, and does differentiate between size and quality of timber. The difficulty has been with its implementation. Resource prices also need to be considered in the context of the broader tax regime.
- 2.17 The best approach will also depend on the ownership and management regime for forests, and responsibilities for different forest functions. In privately owned forests a forest owner may be obliged by law to follow a particular sustainable management regime, including replanting of harvested forests, and “set-asides” of some land for ecological purposes. He/she would pay through the normal tax regime taxes on revenues from forest products, but the Government may also provide incentives for good forest management and/or replanting. Pricing regimes thus depend on the division of responsibilities between the public and the private sector. Local people may also have “rights of access” to the forest for domestic fuelwood purposes.
- 2.18 It is also generally accepted that maintenance of forest cover in some areas, for watershed protection, recreation, greenbelts, etc. is a public good to be financed through general taxation. In Romania for example 70% of forest area is managed primarily for watershed protection, though some harvesting is permitted in these areas. Non-timber forest products (mushrooms, fruits, medicinal plants, hunting rights, etc.) are more important potential sources of revenue in some areas than revenues from timber, and work on this aspect of the forest resource is still at an early stage in Kazakhstan. New landscape-ecological approaches to forest inventory and planning (such as those now actively developed in Georgia) would take these values into account.
- 2.19 In many countries much timber is illegally harvested, often to meet the winter heating needs of the local population, but also by commercial interests. Even when timber is harvested according to management plans, the pricing and marketing arrangements may be non-transparent. Some forest fires may also be started deliberately to permit harvesting of burnt wood at low resource prices.
- 2.20 **Potential areas for support** could include:
- An assessment of the total economic value of forests in Kazakhstan
  - Review and development of pricing and marketing systems adapted to particular ownership, management and leasing systems (including burnt-over forests)
  - An assessment of the causes and features of illegal activities in the forest sector, with clear recommendations for change.

## D. Restructuring Forest Management Functions

- 2.21 During the Soviet period forest management and utilization were both the responsibility of the forest authorities. In most countries responsibility for timber processing has been privatized, while harvesting and timber transport is usually also contracted out on a competitive basis. The experience with forest inventories and management plans is mixed to date, with the public sector retaining this role in several countries. Responsibility for forest protection, including fire and pest management, is generally a public sector responsibility (except in countries with a long tradition of private forest management). The Forest Committee and its regional and local branches currently have about 7,000 staff, compared with 25,000 in 1990, but this has not led to greater efficiency as provisions for in-service training and acquisition of new skills have deteriorated.
- 2.22 Key responsibilities which the Forestry and Hunting Committee and its local staff should retain, include:
- Guidance, review and endorsement of forest management plans
  - Access and contribution to forest management information systems
  - Oversight of implementation of management plans, including harvesting and reforestation where this is contracted out
  - Oversight of forest protection
  - Oversight of afforestation
  - Initial support to technological innovations
  - Preparation of standards for forest products certification, with piloting on a local level
  - Review and revision of regulations regarding establishment of private plantation forests
- 2.23 The new Forest Code of Kazakhstan (enacted in the Summer of 2003) is meant to provide an improved framework for community and private sector involvement in forest management. Important changes are being proposed in the division of responsibilities for forest management and use between the centre and the regions, and between the public and private sectors:
- delegation of most forest management functions from the central Forest and Hunting Committee to state forest enterprises of the oblast governments;
  - provision for «private forest estate». This is meant to promote creation and maintenance of man-made forests and shelterbelts on privatized farmland, as it would legally allow such newly forested lands to be gazetted as forest estate, effectively waiving assessment of property tax on these otherwise nonproductive no-man's lands;
  - elimination of noncompetitive short-term forest use contracts (only contracts for 10 or more years would be allowed, with allocation on a strictly competitive tender basis);
  - mandatory requirement for all commercial forest harvesting operators to be subject to licensing<sup>2</sup>.
- 2.24 The World Bank could provide assistance with capacity building at the local and central level in all of these areas. If the decision is taken to pilot community forest management and leasing, support services would need to be provided to help local communities with management planning. Responsibilities for these services (the Forest Committee staff, local contractors) would need to be determined during project preparation.

## E. Practical Elements of Sustainable Forest Management

### *Forest Fire and Pest Control and Prevention*

- 2.25 Fire and pest management has become an increasing concern in many countries. Fires are part of the natural ecosystem cycle, but the great majority (over 80%) are caused by humans. The average area

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<sup>2</sup> The Government should apply caution to universal application of licensing requirement. Provisions should be developed to allow for community-managed timber harvesting to meet local fuelwood and construction wood needs.

damaged by fire annually in Kazakhstan increased from about 4,000 hectares over the 1985-90 period to 20,000 hectares over the 1996-2000 period (with an additional catastrophic high of 200,000 hectares in 1997). This was only partly due to the increased public access to forests (the number of fires has increased insignificantly); the main reason for a major increase in severity and extent of fire impact (i.e. area burned) is due to the lack of timely fire detection and control which deteriorated because of the lack of financing. Also rural people on farm land adjacent to forests, tend to burn off vegetation and such fires may accidentally spread to forests. Public budgets for fire and pest management have declined, and there is a need to shift expenditures from suppression of fires or pest outbreaks which have already started, to fire prevention and public awareness (which is much more cost-effective). In addition, and linked to budget, finance and governance issues, some fires may have been deliberately started to circumvent the 'no cutting' rule for healthy forests. Fire-damaged timber is presently allowed to be harvested for sanitary reasons at low stumpage prices, and can be a lucrative source of income. Fires and pests are a major concern in the north and northeast, especially in the relic pine forests of the Irtysh River watershed where over 100,000 hectares were severely damaged by fires in 1997 and are being increasingly damaged by pests and uncontrolled 'sanitary' cutting since then.

2.26 **Possible solutions** in specific locations would range from management tools to technical options.

(a) *Management tools in fire and pest management*

- Develop and test, in selected rayons and/or communities, local integrated fire and pest emergency and risk management plans based on national and regional priorities;
- Establish effective regulatory and financial mechanisms for inter-agency and intergovernmental (central-oblast-local) implementation of these emergency and risk management plans;
- Increase public awareness and education for local communities and forest users in fire prevention and management (radio and TV advertisements, publications, billboards, school programs);
- Revise 'Sanitary Cutting Rules' to reduce existing incentives for human-induced fires;
- Integrate baseline field surveys and mapping of forest hazard risks (fire and pest) into regular forest inventory and management planning;
- Strengthen facilities with joint responsibility for farm and forest pest monitoring and prevention;
- Provide specialized training and incentives to local farmers for their involvement in collaborative fire and pest prevention and management (by contract and/or through public easements on private farmland deeds near forests);
- Provide training and incentives to forest rangers and farmers to undertake routine pest detection and reporting;
- Contract out certain forest fire prevention and/or suppression activities to communal or private mechanized units.

(b) *Technical options in fire and pest management*

- Strengthen weather and climate forecasting, fire prediction/monitoring/identification and early warning systems (radio communications, watchtowers, light aviation, satellite fire detection);
- Improve aerial and ground fire management and rapid-response systems, including mobile ground units;
- Carry out restoration and maintenance of firebreaks and access roads;
- Equip roadside rest areas to reduce unnecessary visitation of forests near roads;
- Develop and implement forest fuel management programs (including prescribed burning policies and techniques for cleaning wood debris in cutover and burned areas, dry grass cover on forest edges);
- Strengthen pest prediction and monitoring systems (strengthen collaboration with entomological laboratories in universities and institutes at oblast or regional levels and set up a network of permanent pest monitoring plots in target areas);

- Improve prevention and treatment systems (pest control testing facilities, inter-district units for integrated pest management, quarantine checkpoints for infested areas);
- Finance applied research and development in integrated pest management techniques.

### ***Reforestation, Afforestation and Forest Plantations***

2.27 Reforestation has traditionally been part of the forest management regime, both in forests managed primarily for commercial timber production, and for shelter belts. About 1 million hectares (9% of all woodland) has been planted as shelterbelts and plantations on farmland and, recently, on the dried Aral Sea bed. Reforestation programs have declined over the last 10 years. Reforestation techniques inherited from the 1970's are highly inefficient in utilization of seedlings (excessive density of planting with low survival rates). Alternative, lower-cost reforestation techniques need to be tested and introduced in the northeast, with increased and selective utilization of better seedlings (closed root systems) and more reliance on local manual labor in reforestation works, with significant employment generation in local communities. Afforestation of exposed lands in the Aral Sea bed has been attempted but was poorly implemented and practically stopped in the mid-1990s due to lack of financing. Maintenance of shelterbelts on privatized agricultural land has been more or less abandoned. There has also been only very limited introduction of conservation tillage. There is potential for commercial plantations (e.g. of poplar) in some lower lying, more humid areas, but the administrative hurdles for establishing private plantations have deterred most potential new land owners from undertaking these investments. Revisiting the technologies and cost-effectiveness of different approaches to reforestation (in saxaul forests, degraded agricultural lands, and on burnt forests and harvested forests) would be helpful.

2.28 Opportunities for significant afforestation works in Kazakhstan should also be considered in the context of associated sequestration of atmospheric carbon by the growing biomass. Kazakhstan must still clarify its legal status within the UN Framework Convention on Climate Change (UNFCCC)'s Kyoto Protocol before it can be allowed to 'sell' any carbon credits on the account of the Clean Development Mechanism (CDM). In the meantime, parallel work could be started on building a portfolio of afforestation projects on a bilateral basis with selected 'carbon-emitting' private companies.

2.29 **Potential areas for support** could include:

- (During project preparation) review and development of most cost-effective technologies to reforestation/afforestation, in different geographical areas;
- Reforestation in the Irtysh pine forests, as part of the forest management and fire restoration program (including community participation on a pilot basis);
- Restoration (in pilot areas and together with local population) of saxaul forests;
- Afforestation of the Aral Sea bed;
- Forest plantations on abandoned agricultural lands and eroded lands on a pilot basis;
- Review and revision of regulations regarding private forest plantations, and assistance with development of business plans for private forest plantation investors.

## **F. Summary of Possible Assistance**

2.30. Based on the above, the following activities could be considered for an initial five-year phase of geographically focused pilot investments aimed at developing and implementing new and efficient, locally adaptable management systems for forest rehabilitation, protection and environmentally sustainable development meeting the Kazakhstani people's social and economic needs under market transition conditions.

- a) A regional activity for emergency rehabilitation of the critically damaged Irtysh pine forests in the northeast (Pavlodar and East-Kazakhstan Oblasts). Possible investments would include three key elements.

- i. Development and implementation of new forest management plans for improved and cost-effective reforestation and for a more sustainable hazard (pest and fire) management plans. This would include:
  1. providing better access to forest information at central and oblast levels through reporting, internet and GIS access and aerial photography data;
  2. reviewing and putting in place forest and agricultural fire management approaches (based on local conditions) and judicious investment in fire detection, fire control, fire prevention and modeling, and radio communication;
  3. reviewing reforestation policies and investment in modern nurseries (if possible including the private sector) and replanting technologies for more effective control of desertification/sand advancement.
- ii. Strengthen supervision over logging, interact with – and assist – local forest dependent communities to develop alternative income opportunities to reduce illegal logging and improve conflict management between rural people and forestry rangers.
- iii. Develop small demonstration investments in: (a) possible long-term (community or private) forest management contracts for value-added processing of low-value timber in fragmented birch forests in the north, and (b) testing establishment of private forest plantations for fuel wood and gardening and, possibly (c) small community grants to increase community involvement in reforestation and environmental education.

These components should develop feasible models for replication by the Government in other northern and eastern regions.

b) A regional activity for community-based protection and sustainable utilization of desert saxaul forest in the south (Kyzyl-Orda Oblast)

Investment would be made to develop and implement new forest/rangeland management that would combine desertification control and protection of the saxaul forest, while restoring pasture and forest quality and reducing rural poverty through increased involvement of local communities in integrated forest/range management. Replicable models should be developed and tested here for future application in other southern regions. Investment would be made in:

- i. Improving the capacity in forest and range management at oblast and rayon levels including development of management plans and incentives for sustainable use, communication, fire control (co-ordination between local units and rayon centers and possibly investing in a single comprehensive fire control unit), etc.
  - ii. Improving the capacity and quality of reforestation, including support for (and possible privatization of) nurseries and possible support for saxaul reforestation in the dried Aral Sea bed.
  - iii. In addition, the project could develop demonstration investments in: (a) the effective protection of tugai floodplain forests in the south; (b) rangeland leasing and water supply; and (c) testing establishment of private forest plantations for fuel wood and gardening.
  - iv. Improve the capacity of oblast, rayon and local forestry staff to deal with rangeland management issues (integrated forest and range management) both within and outside the forest management territory, and support for pilot demonstrations in range and forest management and range improvement. Limited strategic improvement in water supply in rangeland to improve access to water for herders as well as for fire control.
- c) A nationwide component strengthening the forest management capability of the Forestry and Hunting Committee and its selected territorial/local branches

Investment would be made in:

- i. Improving the capacity at national, oblast and rayon levels to support forest development and management, and create mechanisms for greater involvement of communities in forest and range-

land planning and supervision through better information and education systems. This includes enhanced ability to communicate with interested NGO's, private sector and other communities. Support will be provided to improve training in more comprehensive forest and range management.

- ii. Forest information systems, including fire and pest monitoring, communication, wood market analysis, economic valuation of forests, etc., and enhancing the capacity to develop forest management plans for specific regions and/or ecosystems.
- 2.31 These should be followed during the next 5-year period by piloting and replication of the more successful activities on a larger scale across the country.

## **G. Expected Benefits**

- 2.32 Benefits from improved forest management, protection and reforestation include economic, environmental, social, economic, and institutional benefits.
- 2.33 Economic benefits in the Irtysh forests would include increased commercial timber available from reduced losses from forest fires, and higher values per unit volume of timber and non-timber forest products harvested from improved management and pricing regimes. Indirect benefits could include increased revenues for the tourism and recreation industry, as a result of increased numbers of visitors to forested areas, and improved watershed function with lower risk of floods.
- 2.34 In the saxaul forests the main benefit would include enhanced livestock productivity following improved animal well-being as a result of increased shade, more productive timber yields, and lower risk of desertification, expansion of sand erosion, and climate change. Plantation forests would yield revenues to operators and would increase timber availability.
- 2.35 Global environmental benefits include enhanced ecosystem values from forest management according to a landscape planning regime which takes into account biodiversity values. They also include climate change benefits from reduced forest fires and reduced desertification, and increased carbon sequestration from reforestation and afforestation. Local benefits would include reduced wind erosion and enhanced soil conservation from reforestation and afforestation.
- 2.36 Social benefits would include greater community ownership from participation in forest management activities, and local employment generation opportunities.
- 2.37 Institutional benefits would include enhanced efficiency of the Forest Committee, and better coordination between the federal and local levels of government.
- 2.38 More specific benefits would include:
- a) a reduction in the losses due to burning. It is estimated that close to 250,000 ha of pine forest burned in the last decade, with an estimated loss in wood that exceeded \$400 million;
  - b) the protection of saxaul forest could restore the forests and ultimately lead to a sustainable yield increase of at least 0.5 m<sup>3</sup>/ha/yr (at about \$10 per m<sup>3</sup>), which for the Forest Fund forest alone would yield an annual \$25 million;
  - c) reforestation and proper maintenance of forest and rangeland will also have benefits in terms of carbon sequestration which, in the future may have significant carbon trading value;
  - d) the environmental and aesthetic benefits of protecting these forests require more detailed analysis (to be done during project preparation) but include increases in water tables, increased biodiversity, decreased erosion and improved sand fixation, and decreases in salt mobilization (by wind). The value of the latter extends beyond Kazakh borders, and is at least of regional if not of global significance.
- 2.39 During project preparation an economic analysis would be prepared which would assist in the evaluation of alternative approaches to project design, and develop the most cost-effective solutions.

## PART 3. SUPPORTING INFORMATION

### A. Forest Resources of Kazakhstan

#### *Background and Key Features*

- 3.1 A large country with limited forest resources... With its land mass of 2.72 million km<sup>2</sup> Kazakhstan is one of the 10 largest countries in the world. It is comparable in size to the area of Western Europe, stretching 2,000 km from north to south and 3,000 km from west to east. However, the geographical location of this land in the center of Eurasia is responsible for a harsh and predominantly very dry continental climate with very cold and windy winters, hot and dry summers, and annual precipitation of only 100 to 300 mm. This makes the land generally unsuitable for either vast forests or large human population. Predominant landscapes are semi-deserts and deserts in the south and west, and steppes in the north and east, and pastures occupy over 70% of all land throughout the country. The average population density is only 5.4 persons per km<sup>2</sup>, and forested areas account for a mere 4.2% of the country's territory. In the traditional measure of forest abundance – total growing stock of timber – Kazakhstan with its 383.7 million m<sup>3</sup> of standing timber ranks rather low compared to other countries in the region (only one-third of Romania and 10% less than Georgia), although in the same league as such countries as South Africa, Vietnam or the Philippines.
- 3.2 ... but a nation that considers its forest important. Kazakhstan has a population of 14.8 million (7<sup>th</sup> largest in ECA) and a sizeable forest land of 11.5 million hectares (3<sup>rd</sup> largest in ECA). Both forests and population are distributed very unevenly over the country's territory, largely following the same hydrological network as water resources availability. The main concentrations of forests and people in Kazakhstan are in the fertile forest-steppe zone extending from Russia along the northern border, at the foothills and slopes of the Altay, Alatau and Tien Shan mountains along the eastern and southeastern borders, and along the Syr- Darya and other main rivers in the southern deserts. Hence, a majority of the nation lives in or near woodlands and uses them for food and fodder, productive soil, gainful employment, shelter and construction materials, fuel, recreation, etc.
- 3.3 Since the 1970's, the Government of Kazakhstan has classified almost 97% of all forests as primarily protection forests with restricted cutting regimes, and two-thirds of them were totally excluded from any commercial timber harvesting. Where there were not enough trees to provide basic functions such as wind protection or fuelwood, the Government has supported establishment of forest plantations and shelterbelts. At present, one-tenth of the country's forests (1 million hectares) are man-made. On a per capita basis, Kazakhstan has almost as much forest land (0.77 ha/person) as the 'forest-rich' United States or Malaysia and is significantly ahead of most ECA countries (except Russia, Belarus and the Baltics).<sup>3</sup>
- 3.4 Different Forests – Different Problems. In fact, it may be more logical to consider Kazakhstan not as one forest nation, but as at least four distinct forest domains that are separated in the geographical sense by the huge treeless space of central and western deserts and semideserts.

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<sup>3</sup> Global Forest Resources Assessment 2000 // FAO, Rome, 2001.

First, there are the magnificent **Altay Mountains** in the east (home to unique Siberian biodiversity spanning into Russia, Mongolia and China, and also a concentration of 75% of commercial-grade spruce and fir timber in Kazakhstan). Then, there is a ‘twin sister’ of Canada’s Great Plains – a vast and rolling **northern forest-steppe** country with birch, aspen and pine forest islands (including the relic Irtysh pine belts) fragmented amidst farmland – an important source of local construction material and fuelwood, as well as a key habitat for wildlife and area for recreation. Thirdly, there are the **Tien Shan and Ile-Alatau Mountains** in the southeast – a globally unique habitat in terms of agrobiodiversity, wild nut and fruit production, a critical water source for the Aral Sea and Lake Balkhash, and an internationally important tourist destination. The fourth forest country, actually the biggest in area (5.3 million ha, or half of the nation’s woodland), is the **saxaul scrub forest of the southern deserts** that spans into the neighboring Uzbekistan and Turkmenistan – a source of high-quality fuelwood and a critical habitat for livestock grazing and sand dune control. In addition, there are **riparian forests** along major rivers. They play an important water-regulating role in the southern floodplains (tugay forest) and constitute almost the only type of forest in the oil-rich but treeless Western Kazakhstan. Lastly, there are man-made **agricultural shelterbelts** on farm land and shrubs on abandoned pastures across the country, which have been recently reclassified into forest land to avoid a management vacuum. These areas may offer promising opportunities for afforestation by private and communal land-holders in the future.

3.5 These forest domains of Kazakhstan differ strongly from each other in overall ecological, economic and even social processes and often face different resource management issues. Such diversity needs to be well understood by policy-makers and managers, especially in a country with strong traditions of centralized decision-making, as it may call for different technical and policy solutions customized to each forest domain. The text below provides more detailed information on Kazakhstan’s diverse forest resource.

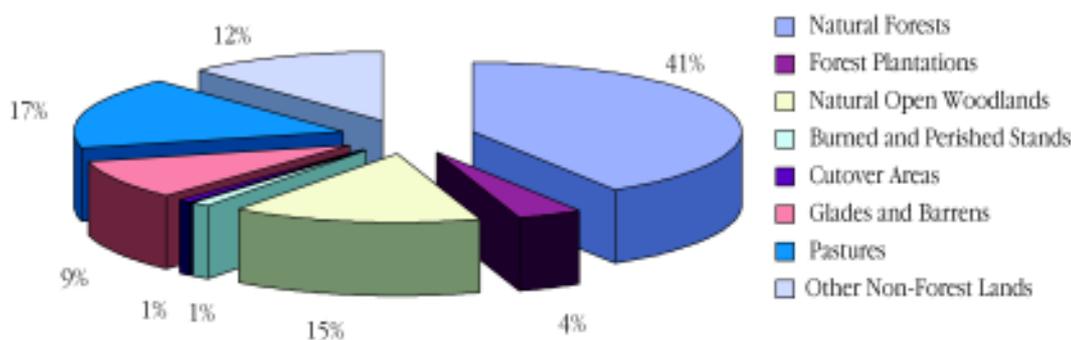
### ***Forest Resource Characteritization***

3.6 Land and Climate. The territory of Kazakhstan is located in the southern part of the temperate zone. The climate is extra-continental, i.e. winters are much colder and summers much hotter than at the same latitudes in Europe. Average daytime temperatures in January are between -8-18°C and can drop to -30-46°C. There is very little snow accumulation during the winter storms and soils can freeze as deep as 1.5-2 meters. Average July temperatures are between +24+30°C and can climb as high as +42+46°C. Annual precipitation in most of the country (except for the high mountains of the east and southeast) ranges from about 100 mm to 300 mm and is much lower than potential evaporation, which results in severe moisture deficit for plants (or vegetation), leading to summer droughts that are often accompanied by dry wind and, consequently, dust storms. Such aridity of the climate results in predominance of desert and semi-desert ecosystems in the natural landscape and requires irrigation of cultivated land, or extensive “low input-low output” rain-fed farming systems. During the summer period (June-October), the fire danger increases sharply and the number of wildfires in the grasslands and forest is high.

3.7 Landscapes. The natural vegetation in the Kazakh plains is distributed following a clear latitudinal pattern of natural zones. The more humid northern plains (300-400 mm of annual precipitation) support the zone of forest-steppes with fertile chernozem soils that extend into the West-Siberian lowlands of Russia. As precipitation levels decline below 300 mm moving south, natural ecosystems change to northern (meadow-grass) steppes and further to classical (feathergrass) steppes, to be followed by semi-deserts and, finally, by sagebrush and ephemeral deserts that extend well into neighboring Uzbekistan and Turkmenistan (see Map 1). This sequence of natural landscapes is reversed into a ‘vertical zonality’ – moving uphill from deserts to steppes to deciduous and coniferous forests and sometimes to alpine meadows – in the mountains that frame the country from the east (Altay, Saur-Tarbagatay), southeast (Djungar-Alatau, Northern Tien-Shan), and south (Western Tien-Shan).

- 3.8 Forest Biodiversity. Current Kazakh flora counts 68 species of trees, 266 species of bushes, 433 species of small bushes, semi-bushes and semi-grass, 2,598 species of perennial grass, and 849 species of annual grass. This biodiversity provides many unique species and is the origin of a number of common nuts and fruit trees (including apples). The region hosts 835 species of vertebrates, including fish, amphibians, reptiles, birds and mammals. The Kazakh forests include coniferous tree species such as pine (*Pinus silvestris*), Shrenk spruce (*Picea Shrenkiana*), Siberian spruce (*Picea obovata*), Siberian silver fir (*Abies sibirica*), Siberian larch (*Larix sibirica*), cedar (*Pinus sibirica*), treelike archa – semispherical archa (*Juniperus semiglobosa*) and Zeravshan archa (*Juniperus seravscanica*); soft-deciduous species such as birch (*Betula verrucosa*), aspen (*Populus tremula*), black poplar (*Populus nigra*), turanga (*Populus diversifolia*), black willow (*Alnus glutinosa*), river ash-tree (*Fraxinus sogdiana*); hard-deciduous trees such as oak (*Quercus robur*), elm (*Ulmus pinnatoramosa*), narrowleaf oleaster (*Elaeagnus angustifolia*), black saxaul (*Haloxylon aphyllum*), white saxaul (*Haloxylon persicum*); bushes such as Siberian juniper (*Juniperus sibirica*), meadow-sweet (*Spiraea acutifolia*), dog-rose (*Rosa canina*), yellow acacia (*Caragana arborescens*), tamarisk (*Tamarix*) and sand acacia (*Ammodendron argenteum*). Hardwoods cover 61.8% of forest areas (about 7 million ha), coniferous forest 15.5% (but the bulk of timber volume), and bushes 22.7%. There are more pines and silver firs in coniferous forests, while soft-deciduous forests mostly include birch and aspen, and hard-deciduous forests comprise saxaul scrub covering almost half of forested areas.
- 3.9 Standing stock of timber amounts to 383.67 million m<sup>3</sup>, including coniferous wood – 236.6 million m<sup>3</sup> (61.7%); soft-deciduous wood – 123.9 million m<sup>3</sup> (32.3%); saxaul – 10.4 million m<sup>3</sup> (2.6%); bushes – 8.5 million m<sup>3</sup> (2.2%). Mature and over-mature forests make 29% of general growing stock. The percentage of forest cover is highest in Zhambyl Oblast (16% cover) and lowest with 0.1% in Aktyubinsky and Atyrausky Oblasts each. The landscape and forest cover are highly variable even within the natural zone.

**Figure 3.1. Land Categories of the Forest Estate (2002)**



- 3.10 Forest Land Categories. As of January 1, 2002, there was a total of 26.1 million ha of land in Kazakhstan gazetted as the forest estate (officially called the “Forest Fund”), i.e. land designated for the purposes related to forest management or encircled by forests. 29% of this area (7.6 million ha) is non-forest lands such as pastures, farms, water bodies, sand, roads, etc. (see Fig. 3.1). The forest lands (18.4 million ha) include 11.5 million ha of stocked forests and plantations and 6.9 million ha of non-stocked forest lands, such as glades, wastelands, burned and cut-over areas.
- 3.11 In 1993, virtually all forests in Kazakhstan (96.9%) had been categorized as the so-called 1<sup>st</sup> Group that included forests with primary water-protection, conservation, sanitary-hygienic, recreational and other functions, plus the forests of protected areas, national parks, protected forest sites, as well as forests of research and historic value. Only 3.1% of Kazakh forests (0.81 million ha in Eastern Kazakhstan) were

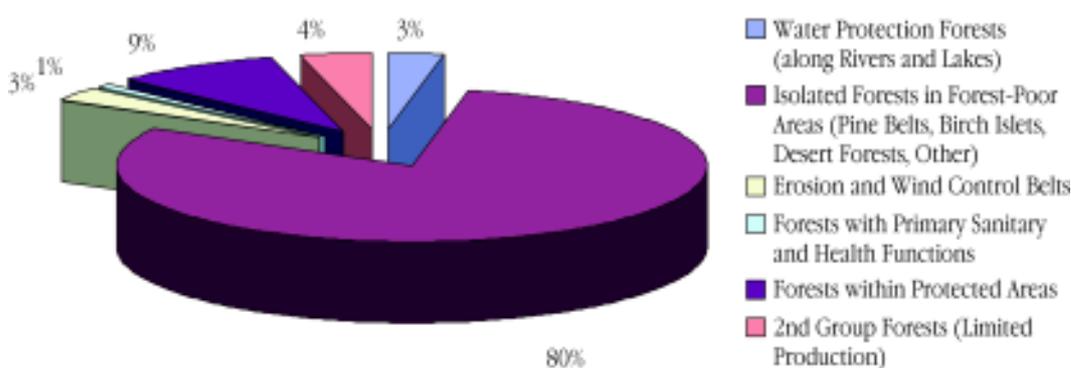
categorized as the 2<sup>nd</sup> Group, i.e. forests of limited commercial importance. The new Forest Code of 2003 has abandoned the division of forests into the 1<sup>st</sup> and 2<sup>nd</sup> Groups and designating all Kazakh forests as primarily protection forests.

One should specifically note the positive trend to strengthen the status of forests as in 1984 the forest fund of Kazakhstan was categorized into 3 groups:

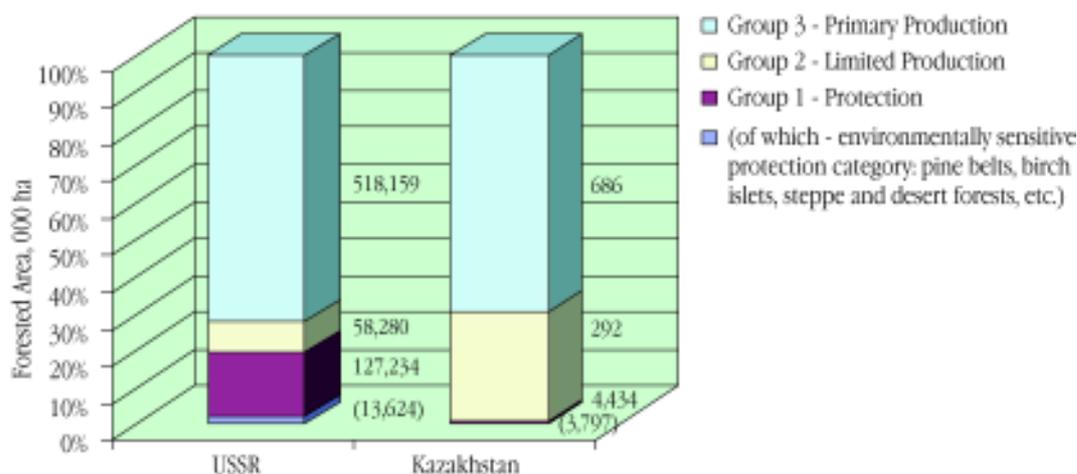
- 1 group – 18.5 million hectares;
- 2 group – 0.6 million hectares;
- 3 group – 1.5 million hectares.

3.12 Protection forests are further subdivided into 19 categories and grouped into 3 categories based on their main function (water protection, sanitation and hygiene protection, natural reserves, etc.), with varying environmental restrictions on utilization (see Fig.3.2). Altogether, these restrictions limit the area of stocked forest lands where commercial utilization may be allowed to only 4.17 million ha (or 36.5%).

**Figure 3.2. Distribution of Forested Lands by Protection Categories (2002)**



**Figure 3.3. Classification of Stocked Forests by Primary Function, 1988**



### ***The Four Forest Domains***

3.13 Northern Forest-Steppe. The forest-steppe zone (Kostanai, Akmola, Pavlodar Oblasts and North Kazakhstan) contains 9.8% of Kazakh forest areas and 36.6% of woodstock. These consist mainly of the island pine and birch forests in the above mentioned oblasts.

3.14 The pine belt forests of Western Siberia and Kazakhstan are located in a steppe between the Irtysh and Ob Rivers. Long and narrow strips of pines grow here in sandy soil. In general, they consist of low-

- density pure pine stands (*Pinus sylvestris*). Most of them have been harvested and replanted in the 1960s. The forests are important for the protection of water resources, soils and the agricultural sector, and they protect land and cities from dune formation and sand infiltration. They are also of high aesthetic importance and represent an important basic source of wood in the region. However, these forests are prone to fire and in large part have been destroyed by fire, as well as illegal logging over the last decade. After the catastrophic fires of 1997-1998, these forests were subjected to large-scale (mostly unauthorized) clear cutting, under the disguise of 'sanitary cuts'.
- 3.15 The island forests of Kostanai province are located – like green islands – among extensive unforested areas on flat terrain. They consist of birch forest islets in the north, insular forests in the north-west, and islands of pine forests in the rolling plains. These forests are exposed to frequent fires. Apart from birches there are also scarce numbers of aspen and pine in dry hilly places. Birch forest islets are the natural accumulators of moisture, thus they are very important for forest reclamation and protection of crops from hot winds and sand storms.
- 3.16 Mountain Forests. The mountain forests are in the Altai and Saur, Dzhungar Alatau and Tien Shan regions. The Altai mountainous region is covered by spruce, silver fir, larch, cedar, pine, birch and aspen forests. Cedar grows in the upper parts of the hillsides, while the lower part is covered with larches, silver firs and spruces. Pines grow along the Kalibansky ridge of mountains and its spurs, and can also be found in the valleys of the Ulba and Uba Rivers. Coniferous woods, as a rule, grow on north-facing slopes, while south-facing slopes are mostly covered with bushes. The Altai forests have been intensively deforested for years, and these cleared areas were covered with grasses, then bushes and birch forests. The northern slopes of the Dzhungar Alatau are covered with Central Asian woods (Tien Shan spruce, Sievers wild apple-tree). This region is the border of natural habitat for northern and Central Asian woods. There also grows Siberian fir. Forest distribution clearly reflects vertical zoning: lower territories are covered with bushes, above there are apple-trees, aspens, birches, there are coniferous and deciduous forests in the middle zone, and in the highest zones coniferous forests are succeeded by the juniper elfin woods.
- 3.17 The woods of the Northern Tien Shan are also zoned, especially on northern slopes. Bushes in the foothills are succeeded by apple-trees and apricots, then deciduous forests. At the elevation of 1300 m deciduous forests are mixed with the Tien Shan spruces, and with elevations of 1500m and up to 2800m there are pure spruce plantations. The upper zone spruces give place to junipers, then pass into alpine meadows. The Tien Shan spruces regenerate with difficulty.
- 3.18 Tien-Shan spruces do not grow in the Western Tien-Shan. Gorges and valleys are the habitat of apple-tree, apricot, pistachio-tree, cherry-plum, sea-buckthorn, current bush, raspberry-cane, barberry, honeysuckle, dog-rose, and almond-tree forests. At the elevations of 2000-3000m, juniper (*archa*) bushes (Zeravshan, Turkestan, semispherical and decumbent) are widely spread.
- 3.19 Desert Scrub Forest. Here the landscapes are characterized by black saxaul (*Haloxylon aphyllum*), white saxaul (*Haloxylon persicum*), zhuzgun (*Calligonum arborescens*), tamarisk (*Tamarix ramosissima* Ldb., *Tamarix gallica*), chingil (*Halimodendron halodendron* (L) Voss.), sandy acacia (*Ammodendron* Fish. ex. DC) and zhantaq (*Alhagi pseudalbagi*). Saxaul and tamarix are the main elements of the woodland in desert and semi-desert zones. Desert bushes are represented by tamarisk, chingil, Calligonum, and desert acacia. Saxaul forests are traditionally used as pastures and provide some shade for grazing animals, while saxaul wood is used as an important, and in some areas the only, source of fuel.
- 3.20 Rangeland. Whereas the saxaul forests are an integral part of the southern Kazakh rangeland, in the northwest the immense rangelands are interspersed with forested islands. A typical characteristic of Kazakh forest management is the interaction with grassland and grassland users.
- 3.21 The tugai or floodplain forest of Central Asia represents a separate class of woodlands, and a microclimatic zone dominated by rivers and regular floods. Tugai forests are spread along the riversides of the southern

rivers. As a rule they include oleaster, willows, poplars, tamarisk, chingil, Calligonum, barberry bushes, and atraphaxis. Unique species of poplar, turanga, hygrophilous relic ash-tree (Sogdian ash-tree) also grow here.

- 3.22 Floodplain forests spread along the sides of the northern rivers and the Ural River. Generally they are comprised of willows, aspens, poplars, smooth ash-trees, birches, bird cherry tree, alder-trees, oaks along the side of the Ural River. These forests are very important for water preservation and regulation.
- 3.23 Shelterbelts. Kazakhstan has a long history of building shelterbelts either as windbreaks or to prevent sand mobilization and dune formation.

## B. Forest Resource Users

- 3.24 As there is great variety in the types and location of Kazakh forests, there is also a great variety in its users. There are commercial users as well as forest dwellers, plant gatherers and livestock herders.

### *Commercial Users*

- 3.25 Logging. For many decades the Kazakh forest was a major supplier of timber, and supported a sizeable timber and wood processing industry of state-owned enterprises, which now have mostly been privatized.
- 3.26 Firewood collectors and users. National forests are major suppliers of firewood. Traditionally forest dwellers used firewood as their main source of fuel, as did the livestock herders and other inhabitants of the saxaul woodlands. Wide-spread use of firewood declined during the Soviet Union when cheap coal and electricity replaced firewood in heating and cooking in rural areas. Use of firewood increased again during transition, largely owing to the disruptions in coal and electricity supply. The Forestry Committee is responsible for allocating firewood chopping quotas, though local akimats also play a role as firewood is distributed to schools and hospitals based on the needs assessment carried out by the oblast government. Most of the urban heating is based on gas and coal. The use of firewood (especially saxaul) for shashlik preparation in summer is increasing<sup>4</sup>, even in urban areas. Supply of such wood is increasingly managed through private channels, often in violation of official rules.

#### **Box 3.1: Firewood and Local Energy Supply – Example of Kyzyl-Orda Oblast**

After the break-up of the Soviet Union, delivery of coal dropped significantly and its price soared. As a result, the population resorted to wood. This usage was particularly high in rural areas of Kyzyl-Orda oblast, where wood (mainly saxaul and tamarisk) comprised nearly 100% of the fuel used for heating and cooking.

After 2000, the energy situation started to change gradually, owing to a better-organized supply of coal and growing availability of natural gas (the latter so far mainly in urban areas). The demand for wood started to stabilize and the government issued a decree prohibiting the cutting of saxaul (except for sanitary cutting). It is expected that with further development of the urban gas network the demand for wood (and coal) would decline, whereas other wood, such as tamarisk, could be used to cover the shortfall in saxaul supply (the usual saxaul yields of 2.5 m<sup>3</sup>/ha are not reached nowadays).

- 3.27 Herders. Herders have traditionally been the major users of forests, especially in the southern woodlands. Currently there is some debate whether to classify the saxaul desert woodlands as forest or as rangeland. Originally these woodlands were managed by cattle-breeding collective farms. However, in 1983 a decision was made to entrust the management of southern woodlands to the Forestry Committee. In order to generate revenues, the Forestry Committee allows seasonal animal grazing in selected leshgoz and saxaul forests. Currently there appear to be very few formal arrangements between forestry entities and cattle-breeders on the seasonal use of these resources. Herdsmen say that these grazing arrangements and associated fees are generally orally agreed on a case-by-case basis with managers of local forestry entities.

<sup>4</sup> Mainly whole wood, use of charcoal is not very common, but may increase with (private) urban demand.

3.28 Plantations. Till now, most of the forest plantations were owned and managed either by the Forestry Committee and its local representations, or by the collectives. There are very few commercial plantations. Government would like to expand (private) commercial forest areas (as foreseen in the action plan of the Forestry Committee). However, the relationship between the Forestry Committee and private forest companies may need some clarifications.

### ***Recreational Users***

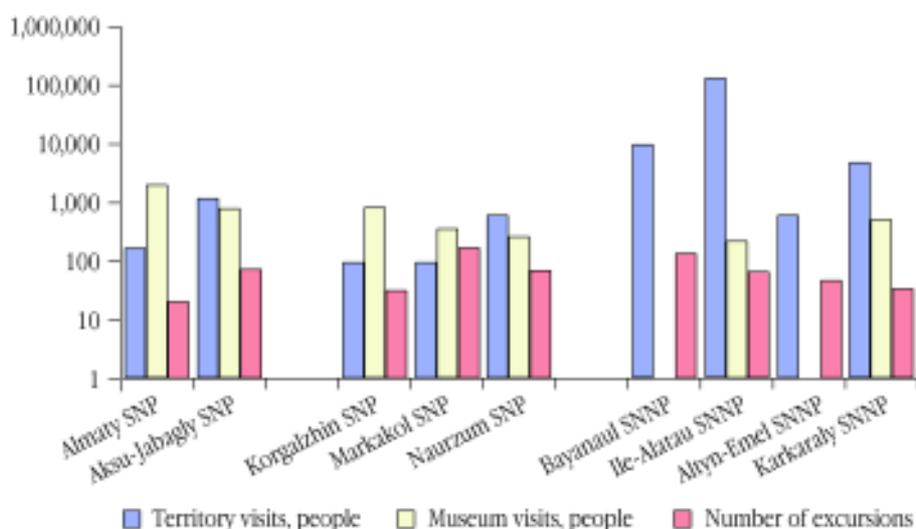
3.29 The development of the tourist industry around national parks and reserves is expected to expand, and will require better oversight and transparent rules, especially if the number of private tourist companies is expected to increase further.

3.30 Recreational users include hunters, fishermen, pine seed (nut?) pickers, mushroom gatherers, etc. The Forest Code should recognize these use forms and users, and assure access and oversight over sustainable use.

### ***Institutional Users***

3.31 Some forest areas are still managed by agricultural farms/collectives, particularly islands of forest in the steppe, where the transaction costs of adequate Forestry Committee supervision and management are high. Agricultural farms and municipalities are also responsible for managing their shelterbelts.

**Figure 3.4. Tourist Visits in National Parks and Nature Preserves (2000)**



### ***Indirect Users and their Representatives***

3.32 Kazakh society has a strong liking for nature and forest as a source of “fresh air” and recreation. These environmental aspects are strongly promoted by a number of forest-related non-governmental organizations. Unfortunately, though these NGOs have genuine interest in forest and environmental issues, their institutional and advocacy-related capacities are variable. Some however, play an important role in numerous initiatives ranging from raising public awareness, to activities targeting protection of essential natural resources. These NGOs raise public awareness about the environmental dangers of forest fires and attract public attention to the issue of nuclear contamination inherited from the past.

3.33 Other societal uses of forests, and/or recognition of their importance include: (i) prevention of erosion and sand dune protection of human settlements, and (ii) the role of forests in the sequestration of carbon dioxide (a “greenhouse” gas). The value of these use forms is significant but difficult to determine, and here the State and NGOs have an important role to play.

### C. Forest Institutions and Governance

3.34 The forest governance system was more or less inherited from the Soviet Union and consisted largely of a system of forest collectives (leskhoz) and reserves managed by a central forestry committee (i.e. the Committee for Forestry, Fishery and Game Management, i.e. “Forestry Committee”). Originally agricultural collectives managed some of the southern forests<sup>5</sup> as well as small island forest in the north. However, gradually some changes have been made in the last decade that reflect the different concerns about forestry in a country where forests only cover 4% of the land resources, and where the objectives of forestry and forest use differ from that of the typical northern forests that dominated the Soviet Union.

3.35 The transition of the 1990-2000 and the establishment of a sovereign Republic was accompanied by complicated political and socio economic changes. These changes also affected the forestry sector and its governance structure. The system of forest management and wood industry has undergone several reorganizations in the last decade. For example:

- (i) The Ministry of Timber and Wood Processing Industry was abolished a decade ago with the shift of this industry from state to private sector<sup>6</sup>.
- (ii) The southern (saxaul) forest were transferred to the Forest Committee in 1988; the northern island forest were transferred more or less by default when the agricultural collectives broke up and changed their ownership structure.
- (iii) The rural sawmills and processing workshops have been separated out of the “leskhoz” and became independent structures i.e. republican state enterprises that were expected to carry out the function of procurement and processing of timber products, growing of forest planting stock, implementing forest rehabilitation works, forest protection and security and others.

However, some of the concept of the former Soviet Union were maintained, in particular

- (i) the concept that all forest resources are owned by the State (i.e. its “Forest Fund”)<sup>7</sup>
- (ii) a centralized management system.

3.36 Although the separation of private sector (commercial) functions from the supervisory functions of the Committee is appreciated, there is growing concern that continued changes will further weaken public sector capacity to manage, protect and regenerate forests that play critical role in tourism as well as water regulating and sand control functions.

#### **Objectives**

3.37 With scarce and still declining forest resources the overall strategy in forest management is protection of the existing forest resources. This is managed by the following objectives:

- (i) Erosion protection.
- (ii) Fire and pest management
- (iii) Reforestation
- (iv) Recuperation and tourism

3.38 These objectives, however, assumed mainly a centrally management forest management systems with little or no input from the common users and/or inhabitants. The concept of community

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<sup>5</sup> These predominantly saxaul desert forest were mainly used by transhumant livestock herds and till mid-1980s – early 1990s managed by the livestock collectives.

<sup>6</sup> Mainly of the inefficient State enterprises because of competition with increasing import of more modern and higher quality materials from Europe and some Arabic countries. As a result, the share of woodworking and furniture industries in the structure of industrial production dropped from 2.7 to 0.2%.

<sup>7</sup> At the same time, some of these resources can be leased for short-term (up to 1 year) or long-term (from 1 to 50 years) on a fee basis.

forest and rangeland management was not yet well-understood or accepted and further work is needed to determine how to apply this concept under conditions in rural Kazakhstan. Also, although the perceived risks (illegal cutting, fire, pest, etc) have increased in recent years and substantial primary forest has been lost, there is no cohesive policy on how to prioritize and mitigate these risks.

- 3.39 During the Soviet period forest management and utilization were both the responsibility of the forest authorities. In most countries responsibility for timber processing has been privatized, while harvesting and timber transport is usually also contracted out on a competitive basis. The experience with forest inventories and management plans is mixed to date, with the public sector retaining this role in several countries. Responsibility for forest protection, including fire and pest management, is generally a public sector responsibility (except in countries with a long tradition of private forest management). The Forest Committee and its regional and local branches currently have about 7000 staff, compared with 25,000 in 1990, but this has not led to greater efficiency as provisions for in-service training and acquisition of new skills have deteriorated.
- 3.40 Key responsibilities which the Forestry and Hunting Committee and its local staff should retain, include:
- Guidance, review and endorsement of forest management plans
  - Access and contribution to forest management information systems
  - Oversight of implementation of management plans, including harvesting and reforestation where this is contracted out
  - Oversight of forest protection
  - Oversight of afforestation
  - Initial support to technological innovations
  - Preparation of standards for forest products certification, with piloting on a local level
  - Review and revision of regulations regarding establishment of private plantation forests

### ***Regulations***

- 3.41 The Constitution of the Republic of Kazakhstan (1995) designates forests as a type of natural resources that are property of state. Consequently, as enforced by orders of the President and by national legislation such as the land and forest legislation, and legislation on specially protected natural areas, lands of the forest fund, flora (including forests) and fauna, as well as specially protected natural territories shall not be privatized.
- 3.42 The basic law of the forest legislation in Kazakhstan is the Forest Code of the Republic of Kazakhstan adopted in June 2003. In general the overall objectives of the forest legislation are to regulate ownership, use and management of forests and to provide for the conditions to improve ecological and resource potential of forests, rational and inexhaustible use of its resources, conservation, protection and reproduction, strengthening of legal base.
- 3.43 The Government has revised the Forest Code and developed a medium-term sector program for 2003-2005 (this work follows adoption of the new Land Law and Tax Code in 2001 and is influenced by the recent government decentralization initiatives).
- 3.44 The new Forest Code of Kazakhstan provides an improved framework for community and private sector involvement in forest management. Important changes are being proposed in the division of responsibilities for forest management and use between the centre and the regions, and between the public and private sectors:
- delegation of most forest management functions from the central Forest and Hunting Committee to state forest enterprises of the oblast governments;
  - provision for «private forest estate». This is meant to promote creation and maintenance of man-made forests and shelterbelts on privatized farmland, as it would legally allow such newly forested

lands to be gazetted as forest estate, effectively waiving assessment of property tax on these otherwise nonproductive no-man's lands;

- elimination of noncompetitive short-term forest use contracts (only contracts for 10 or more years would be allowed, with allocation on a strictly competitive tender basis);
- mandatory requirement for all commercial forest harvesting operators to be subject to licensing<sup>8</sup>.

### ***Institutions***

3.45 Implementation of the forest legislation and management of forest resources, fauna resources and specially protected natural areas of the Republic with the right to submit those resources for use have been assigned to the Committee of Forest, and Hunting under the Ministry of Environment and Natural Resources (Forestry Committee).<sup>9</sup>

3.46 The Committee has the power to issue regulations and ordinances to assure sustainable forest use. Except the Committee at the central level, there are 14 oblast departments on forest and biological resources within the structure of forestry department and conservation and protection of forests; they include 140 state institutions on protection of forests and fauna, regional branches of the national parks, 9 state natural reserves, 6 state national natural parks, 15 national organizations, 13 oblast inspections of state control for conservation, reproduction and use of flora and fauna, especially on protected areas, 4 basin departments on protection of fish stock and regulation of fishery, regional and inter-oblast lake inspections.

3.47 Through the 1990s, resources for staffing and logistical support fell sharply. The number of functioning fire stations fell by 80% and most machinery was not replaced and became obsolete.

3.48 Forestry operations and related silvicultural equipment were recently divested from the State (i.e. the Forestry Committee). The sawmills and other economic branches have been separated out of the "leskhoz-es" and became independent structures – republican state enterprises<sup>10</sup> (RSE) executing functions of procurement and processing of timber products, growing of forest planting stock, implementing forest rehabilitation works, forest protection and security and others financed out of their own sources or out of budgets allocated for provision of state order. In September 2001 these republican state enterprises have been transferred to the responsibility of (into public ownership) of local executive bodies (oblast akimats).

#### **Box 3.2. Forest Management Institutions in Kazakhstan**

The structure of the Committee of Forestry, Fishery and Hunting in its Forestry sector includes:

- 9 state natural reserves;
- 6 state national natural parks;
- 14 oblast territorial administrations or forestry and bio-resources as well as 138 subordinate to them state institutions for the protection of forests and wildlife;
- Kzyl-Dzhyghida State Conservation Institution;
- Kazakh State Forestry Design Institute (Kazgiproleskhoz);
- Kazakh State Forest Inventory Enterprise;

<sup>8</sup> The Government should apply caution to universal application of licensing requirement. Provisions should be developed to allow for community-managed timber harvesting to meet local fuelwood and construction wood needs.

<sup>9</sup> In August 2002, the Forestry Committee was transferred from the Ministry of Natural Resources and Environmental Protection to the Ministry of Agriculture.

<sup>10</sup> The objective of separating state enterprises out of the forest management units, besides delegation of managerial and economic functions, was to improve the productivity and financial structure of the sector. However, due to weak management, old equipment, non-competitiveness of the products, orientation on the traditional market of insolvent consumers, lack of turnover assets, and burden of accumulated debts these objectives could not be accomplished. By transferring state enterprises under the jurisdiction of local executive agencies, the problem of their rehabilitation was shifted to the, also meager, of local budgets.

- Kazakh Base of Airborne Protection and Service of Forests;
- Almaty Forestry Selection Center State Enterprise;
- Kokshetau Forestry Selection Center State Enterprise;
- Kazakh Institute of Upgrade Training of Forestry Managers and Specialists;
- Kazakh Republican State Enterprise of Forest Seeds;
- Okhotzoooprom Republican State Enterprise.

Other Ministers and Departments manage the Burabai National Park (Presidential Administration and the Government of the Republic of Kazakhstan) and the Experimental Forestry Research Facilities (Ministry of Education and Science of the Republic of Kazakhstan).

- 3.49 The consequences of these recent changes are not yet clear, and their implementation is still ongoing. Still, the forestry committee has withdrawn from economic functions in the area of forest use. It is authorized, however, to provide services only to users, the payments of which shall be fully transferred to the national budget. So far, this transfer of function was not accompanied by strengthening the typical public sector role in carrying out the prescribed forest management and protection activities at local level.
- 3.50 The Forestry Committee has delegated its forest management tasks to the 14 oblast forest departments and 136 forestry districts. Both are mainly financed through central funds. However, both may receive targeted funding from oblast Governments (mainly ad-hoc funding, in recent years mainly for fire control) also supported by selected forestry enterprises
- 3.51 Staffing and skills. The current estimate of staff employed in the sector is around 5 thousand. For the last few years the number of the personnel has decreased, as state budget allocations decreased. This decrease affected operations as well as staffing. Low salaries in the sector until 01.01.2002 and continuous reorganizations caused an increased instability in the administrative staff and forest guards.
- 3.52 At present about 30% of the administrative staff of the oblast departments and State enterprises for the protection of forests and wildlife have special training. Sufficient number of trained junior managers and forest guards are also missing.
- 3.53 To solve this problem it is necessary to upgrade the level of specialized training of personnel and fully satisfy the demand of the sector in senior executives and junior managers.
- 3.54 The pyramid described in Box 3.3 and Figure 3.6 below provides an additional tool for formulating forest management, which helps countries to assess progress with putting into place sound management regimes.

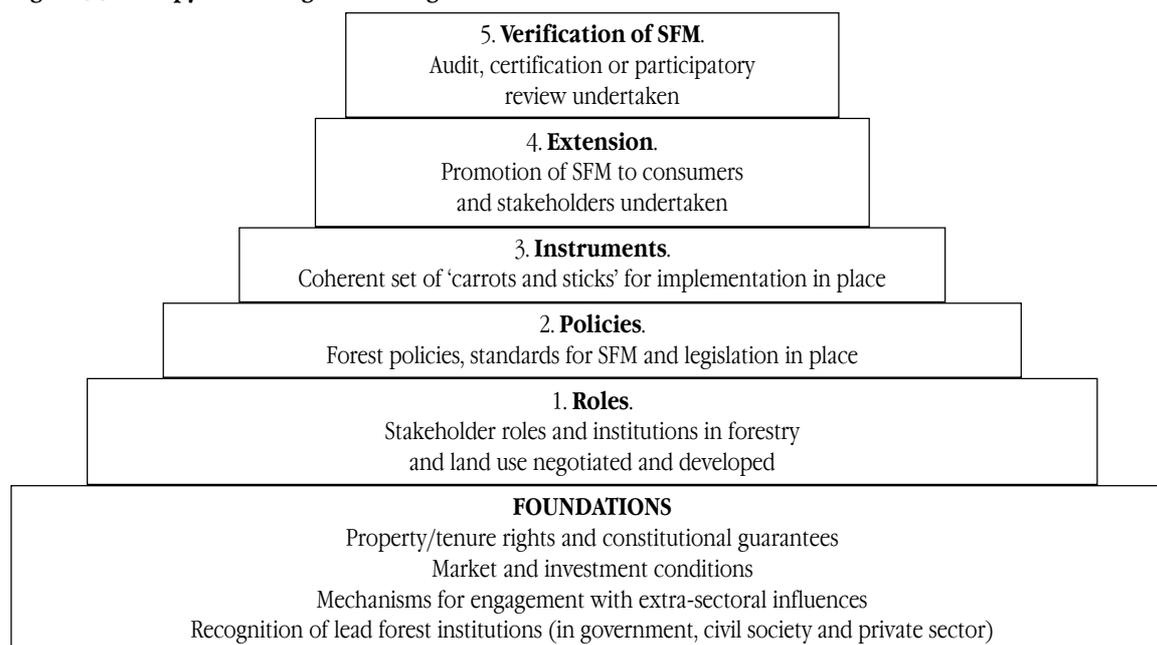
### **Box 3.3. 'The Pyramid': A diagnostic and planning tool for good forest governance**

The World Bank-WWF Alliance for Forest Conservation and Sustainable Use is developing and testing a special diagnostic and planning tool for good forest governance, which was called the 'Pyramid'. Its objective is to offer a framework to stimulate participatory assessment and target-setting in forest governance at country level. Witnessed by well-facilitated multi-stakeholder processes, the tool can help fill the 'forest governance gap' between assessing and accelerating field level progress in sustainable forest management (SFM), and international policy, assessment and reporting. By filling this gap, stakeholders' capabilities to deliver national governance that supports local forest governance – and potentially improves international forest governance – can be improved.

Governance is complex, covering global-local links, sector-sector links, and differing values, but it is increasingly recognized that governance problems underlie many forest problems. In recent years some progress has been made in developing better enabling conditions for forest governance in many countries. Great progress has also been made in forest-level assessment and planning, but it has limitations. Meanwhile, international assessment and reporting on the forest sector has failed to improve forest performance significantly.

It is possible to identify some of the elements of good forest governance that are common to a wide range of different nations. These elements can be grouped in several 'tiers' in a simple 'pyramid' diagram:

**Figure 3.5. The 'pyramid' of good forest governance**



- The pyramid describes those good governance elements which are significantly under the control of forest stakeholders
- The pyramid's 'foundations' are less directly controlled by forest stakeholders – but it is crucial that forest stakeholders understand the constraints and opportunities emanating from beyond the forest sector to enable them to argue their case and influence those with the power to improve the foundations.
- Each tier represents a group of elements. Their vertical arrangement suggests a generic sequence. But the 'entry point' tier, and the precise sequence in which tiers and elements are addressed, should depend on country context and the concerns and timing of in-country discourse.
- However, elements in the tiers towards the bottom of the pyramid tend to be more basic matters – there are more of them, and they tend to be more fundamental to progress in many contexts.

3.55 An elaborated form of this diagram provides the conceptual basis for a more detailed approach to diagnosis and planning. A multi-stakeholder process to carry this out would include a build-up period of stakeholder communication followed by a stakeholder forum. Three questions are asked of each of about fifty elements of good forest governance: What's working? What's missing? What needs to be done? A simple 'score' assessment of each element is also generated. The information thus generated is recorded in a set of tables – one for each tier of the pyramid as follows:

<b>Element of good forest governance</b>	<b>What's working?</b> (output, quality, impact)	<b>What's missing?</b> (gaps, problems)	<b>Score</b> (red, amber, green)	<b>What needs to be done?</b> (next steps)
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3.56 The tool is designed for creative, rather than prescriptive use; to stimulate ideas not to lay down the law. A case study using the tool in Brazil has been carried out. The objective was to provide a preliminary assessment of the applicability of the tool to assess the status of forest governance in Brazil, and specifically the national forest program. The Brazil case study shows that the use of the tool is highly subjective, and its legitimacy depends on who does it, and how. An effective multi-stakeholder process is essential. Furthermore, only if this tool becomes further developed and used by credible teams in a range of countries and contexts will it become possible to 'calibrate' its use to compare findings from one place to another.

## D. Forest Sector Economics and Finance

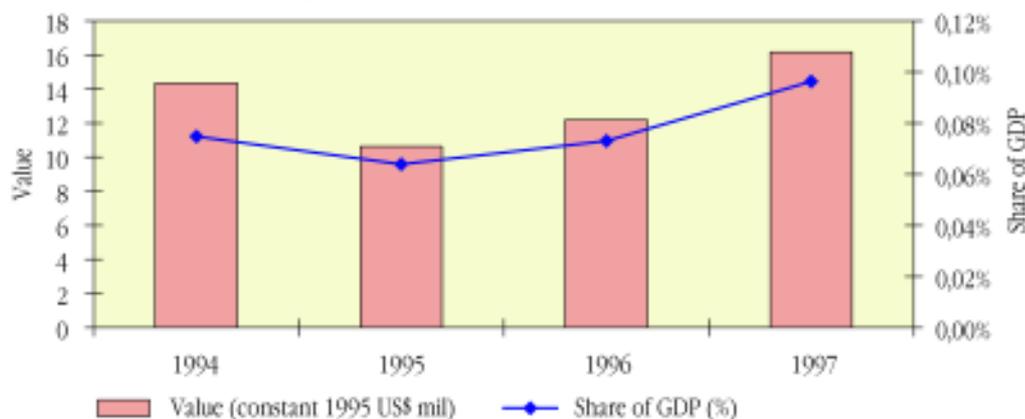
### *Background*

- 3.57 The past decade was characterized by complex political and economic processes related to the establishment of an independent Kazakhstan. Structural changes occurred in the economy against a backdrop of significant budget deficits, redistribution of commodity markets, a decline in production, deteriorating social services, and a general fall in the demand for products by the population. The hardships of that period adversely affected the forestry and woodworking industries, which were the main consumers of forest resources in the country. Major woodworking and furniture manufacturers ceased operating because, without support from the government, they could not compete with the growing imports of modern, high-quality goods from European and Middle Eastern countries.
- 3.58 According to official legislation, resources within the Forest Fund—including land, forests, plants, wildlife, and specially protected wilderness areas—are not subject to privatization. However, some of these resources may be leased on either a short-term (up to one year) or long-term (from 1 to 49 years) basis. Responsibility for the management of these resources, including the ability to make them available for use by private parties, rests with the Forestry Committee, under the Ministry of Agriculture (and recently transferred from the Ministry of Natural Resources and Environmental Protection).
- 3.59 Before 2000, the sector under the Forestry Committee was responsible for everything from silviculture and forest protection to the marketing of forest products, and was generating revenues from these activities. Under the Forestry Committee, the country was divided into forestry management units, or leskhozoes. In 2000, wood processing operations and facilities, as well as other forestry operations, were separated from the leskhozoes in order to establish autonomous entities called National Forest Enterprises (NFEs). These NFEs were given the ability to harvest and process primary forest products, establish nurseries, and perform reforestation, forest protection and other operations funded from their own resources or budget proceeds earmarked to cover the costs of state orders. In September 2001, the GoK issued a Resolution to divest the NFEs from the Forestry Committee and put them under the jurisdiction of the Oblast Akimats.

### *Importance of Forest Production*

- 3.60 Forestry does not play a major role in the Kazakh economy, and its importance has been decreasing over time. The forest sector's sustainable financial contribution to the Kazakh economy could, however, be greatly increased through competitive wood marketing and the introduction of improved harvesting, processing, and manufacturing technologies.

**Figure 3.6. Value of Forestry Output and Its Share of GDP**



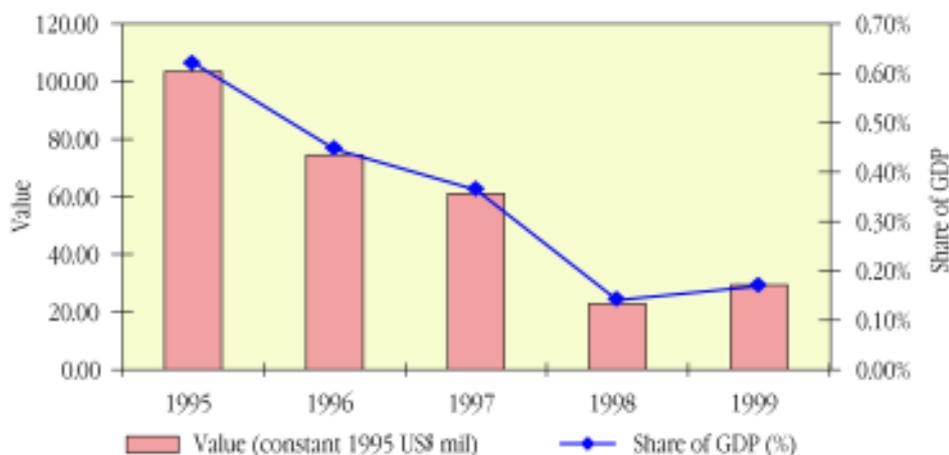
3.61 Economic data on the Kazakh forestry are very limited and of questionable accuracy. The data are not adjusted for inflation, and are not provided in a single currency, but in rubles in some years and tenge in others. Disaggregated data for the forestry sector is not even available after 1998. As a result, meaningful comparisons over time are impossible. Based on the data that is available, it is estimated that the production of timber and non-timber primary forest products under the Forestry Committee accounted for less than 0.1 percent of GDP in any given year from 1990 to 1997. However, these figures do not include the value of output from forest product enterprises, or of timber allocated to the networks of woodworking enterprises under other ministries, including Transport, Agriculture, and Construction.

At present, Kazakhstan's own resources cover no more than 20-30 percent of the national requirements for timber. The remainder is imported from Russia, as well as to a lesser extent from Ukraine, Belarus, and certain countries outside the former Soviet Union (primarily high-value wood used for finishing furniture).

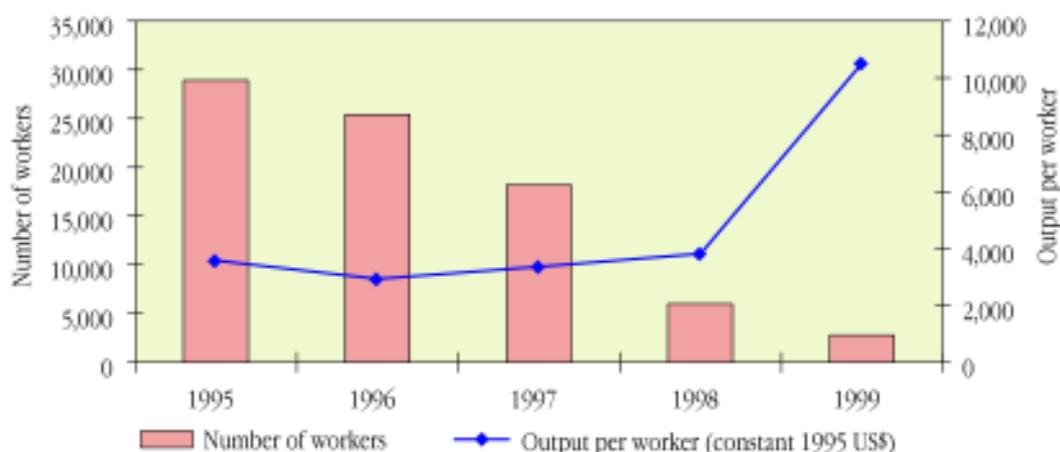
### ***Importance of Forest-Dependent Industries***

3.62 As a result of the economic upheaval of the past decade, the woodworking and furniture industries have experienced a substantial decline. While they accounted for 2.7 percent of total industrial output in 1990, by 1999 that figure had dropped to 0.2 percent. As a result, the industry harvested only 0.885 million m<sup>3</sup> of timber in 1999, as opposed to 2.5 million m<sup>3</sup> in 1991, a decline of 65 percent.

**Figure 3.7. Output of Woodworking and Furniture Industry, and Share of GDP**



**Figure 3.8. Number of Workers in Woodworking and Furniture Industry, and Output per Worker**



### ***Trade in Forest Products***

3.63 The recently opened roundwood markets of neighboring China, Kyrgyzstan, and Uzbekistan have a nearly unlimited demand for timber, which has contributed to the emergence of a network of export-focused private forest logging and marketing firms. The most noteworthy of these are the Les Vostoka Trade House, Ltd., which has acquired a virtual monopoly over the marketing of timber from the forest-rich East Kazakhstan Oblast, and the Interles trading company, which ships timber salvaged from vast areas of burnt stands in the Semipalatinsk region. In 2000, unprocessed timber exports totaled 65,943 m<sup>3</sup>, which is 2.4 times the total for 1999. It is also estimated that 200,000 m<sup>3</sup> of timber has been illegally exported from the Semipalatinsk Region to neighboring countries.

**Table 3.1. Market Prices for Timber in Domestic and Foreign Markets, April 2002 (2002 US\$)**

	<b>Eastern Kazakhstan Oblast</b>		<b>Almaty City</b>
	<b>Eastern Region</b>	<b>Semipalatinsk Region</b>	
<b>Domestic market</b>			
Coniferous bolt-timber (large)	26-29	16-19	
Coniferous bolt-timber, unedged	45-58	39-45	
Coniferous bolt-timber, edged	65-78	up to 65	
Deciduous bolt-timber, unedged			84-89
Mine stand		16	
Firewood	5-8	up to 7	
<b>Foreign market</b>			
<u>Exports</u>			
Round timber	42	30-60	
Bolt-timber, edged	90-100		
<u>Imports from Russia</u>			
Coniferous bolt-timber	78-97		97-99

### ***Forest Resource Valuation***

3.64 In order to make informed decisions about the management of Kazakhstan's forests, it is important to have accurate data on the value of forest products and services. This includes not only the direct benefits received from timber products, but also from non-timber forest products, recreation, tourism, and ecosystem services, among others. In this respect, Kazakh forest management is sorely lacking. Even Kazakhstan's top forest experts do not have good data on the value of forest products. Data on the financial value of forest products is only available to 1997, and it is not adjusted for inflation or presented in a single currency. This makes meaningful comparisons over time impossible. The data is also compiled in an unorthodox and unreliable manner. No information could be found on an economic (as opposed to financial) valuation of forest resources.

As in many other countries, there seems to be no data available on the economic value of ecosystem services, such as watershed and soil protection, climate control, and nutrient cycling.

### ***Salt stabilization***

3.65 The Government has promoted a program of saxaul afforestation in the dry Aral Sea bed. The Aral Sea crisis is well known. The inland sea has lost more than 80 percent of its volume since 1960, exposing more than 36,000 square kilometers of former seabed and leaving ecological devastation in its wake. The exposed areas are thick with agricultural chemical residues and salt, which are carried by strong winds and deposited over a wide radius (250-300 km), negatively affecting crops, natural vegetation, soil quality, water supply, air quality, and the health of animals and people. It is estimated that 75 million tons of toxic

salt and dust are blown away annually.<sup>11</sup> While plans have been proposed to increase the flow of water to the Aral in order to stabilize the desiccation process, to date little has been done, and it is highly unlikely that the Aral will ever completely re-fill its former seabed. In response, the GoK has embarked on a program to establish saxaul forests over large areas of salt plains in order to mitigate some of the negative impacts of wind erosion and salt mobilization. Of the 3.6 million hectares of former seabed, the GoK planned to plant trees on 115.5 thousand hectares. However, of this, only 34.6 thousand hectares have actually been planted, and only 20.4 thousand hectares of those survived (0.6% of the dry seabed). The results of the program were generally considered to be unsatisfactory. (costs, Table 5)

3.66 The GoK would like to expand the program of dry Aral Sea bed afforestation. This begs two questions: 1) What would be the benefits of such a major investment?; and 2) Is the planting of saxaul forest the most cost-effective way of stabilizing the dust? On the first point, there is apparently no concrete answer. Damage has been estimated at 0 to 11 percent for crops and pasture, and 10 to 15 percent for orchards, but it has not been aggregated.<sup>12</sup> It is also unclear whether these effects are due to salt mobilization alone, or other factors as well (e.g., salt in irrigation water). The same is true for health impacts. There does not even appear to be agreement among researchers on the extent of the salt mobilization itself.<sup>13</sup>

Regarding the second question, the planting of saxaul forests on the Aral Sea's dry bed is not the only method of arresting the mobilization of salts, and may not be the most cost effective. The negative consequences of the drying of the Aral Sea certainly go beyond salt mobilization, and a more integrated strategy involving more efficient water management and sustainable land use may be more beneficial in the long run.<sup>14</sup> In the short run, it is possible that alternative technologies such as the planting of salt grass may be more cost effective (see Box 2). It is advisable that further investigation into the economic benefits and costs of alternative approaches to salt stabilization be undertaken in order to determine the extent to which additional investments are warranted.

### *Carbon sequestration*

3.67 Reforestation, afforestation, and proper maintenance of forests and rangeland will also have benefits in terms of the sequestration of atmospheric carbon. In the future, this attribute may generate significant value from the trading of carbon. The world carbon trading market is rapidly growing and will more than triple in 2002, as companies prepare for the Kyoto Protocol on limiting carbon pollution. The Bank-managed Prototype Carbon Fund (PCF) invests in projects that will produce greenhouse gas emission reductions. So far, the Bank has participated in 26 projects with emission reduction purchases averaging US\$3-4 per ton. Recently, funding was approved under the PCF to purchase carbon as part of a project to afforest 6,728 hectares of degraded agricultural land in Romania. The PCF will provide US\$3.67 million to purchase the carbon sequestration value of the new forests.

Kazakhstan could increase the revenue-generating potential of its forests and grasslands by participating in the carbon-trading market. It could begin by building a portfolio of afforestation projects on a bilateral basis with select carbon-emitting private companies. However, to be able to sell any carbon credits under the Clean Development Mechanism (CDM) and benefit from the PCF, Kazakhstan will have to clarify its legal status within the UN Framework Convention on Climate Change (UNFCCC).

<sup>11</sup> *The Aral in Crisis*, UNDP, Tashkent, 1995.

<sup>12</sup> *Assessment of the Social-Economic Damage under the Influence of the Aral Sea Level Lowering*, INTAS-RFBR 1733 Project, NATO SFP 974357 Project, 2001.

<sup>13</sup> *Creeping Environmental Problems and Sustainable Development in the Aral Sea Basin*, M. H. Glantz (ed.), Cambridge University Press, 1999.

<sup>14</sup> "The Aral Sea Basin Crisis: Transition and Environment in Former Soviet Central Asia", M. Spoor, *Development and Change* Vol. 29 (1998).

## **Pricing Policy**

### Stumpage charges

3.68 In the past, stumpage prices were calculated based on an approach developed in the former Soviet Union with no reference to actual market prices for timber. These prices were calculated on the basis of estimated costs. In theory, the average price for 1 m<sup>3</sup> of timber was to cover the average expenditures by the Forestry Committee to produce 1 m<sup>3</sup> of timber. These rates were later reduced to a minimal fee under pressure from forest industries, and ceased to cover the costs of production. Recently, the GoK passed Resolutions 536 (in 2001) and 431 (in 2002), which established new Rules for Calculating and Budgeting Forest Use Charges. As a result, the base rates for stumpage are meant to be calculated from the market price of the end products (e.g., roundwood at market), deducting for costs incurred by the forest user, his standard profit, transportation and marketing costs, etc. Then, the base price is supposed to be multiplied by a coefficient to account for variables such as tree size, terrain, felling technologies, distance to public roads, etc. The new base prices are several times higher than previous stumpage rates (e.g., 6.6 times higher for conifers and hardwood broadleaf species). The new system does introduce the concept of a market price. However, in practice it would clearly be extremely cumbersome, if not impossible, to implement as intended. Collecting all the necessary information on prices, costs and physical attributes would require prohibitive expenditures. It also places the onus of economic valuation on the Forest Committee, rather than on the purchaser of timber. Further, the GoK Resolutions contain no provisions for indexing prices to inflation or market price changes. As an alternative, a more market-based system—such as some form of auction—could be explored. There has been some success in establishing the auction systems for concessions to private enterprises in other countries (see Box 3). This has the potential to increase the revenue generated from forests, make stumpage rates more responsive to market realities, and shift most of the risk for the pricing decision to the private enterprises. Of course, care must be taken to ensure that there are enough bidders to make the auction competitive, that there is no collusion between bidders and officials, and that the auctions are held in a transparent manner. However, the government can still establish a reserve price below which it will not sell, and can even withdraw a concession if there is not an adequate number of bidders. Besides, there is scope for collusion even under the current system, whereby poorly remunerated forest officials can be persuaded to underestimate the value of standing timber to minimize the stumpage charge.

**Table 3.2. Base Stumpage Rates for Standing Timber (2002 US\$)**

Species	Commercial timber (debarked, by upper cut diameter)			Fuel wood (with bark)
	Large (> 24 cm)	Medium (13 to 24 cm)	Small (3 to 12 cm)	
Pine	7.92	5.65	2.79	1.10
Schrenk Spruce	10.32	7.34	3.64	1.43
Siberian Spruce, Fir	7.14	5.06	2.53	0.84
Larch	6.36	4.55	2.21	0.78
Siberian Pine	14.29	10.19	5.00	1.23
Juniper (Archa)	9.55	6.75	3.38	1.43
Oak, Mountain Ash	14.29	10.19	5.00	2.21
Black Alder, Maple, Ulm, Lime	3.18	2.27	1.10	0.71
Saxaul	0.00	0.00	0.00	3.25
Birch	3.57	2.53	1.23	0.84
Aspen, Willow, Poplar	2.79	1.95	0.97	0.58
Walnut, Pistachio	17.34	12.40	6.10	1.88
Apricot, White Acacia, Wild Cherry				
(Alycha), Cherry, Plum, Apple, Other Fruit	10.13	7.21	3.57	1.23
Juniper, Creeping Pine			1.82	0.97
Yellow Acacia, Tamarix, Brush Willow,				
Hyppophae, Juzgun, Chingil, Other Shrubs			1.04	0.65

Figure 3.9. Growing Stock by Type

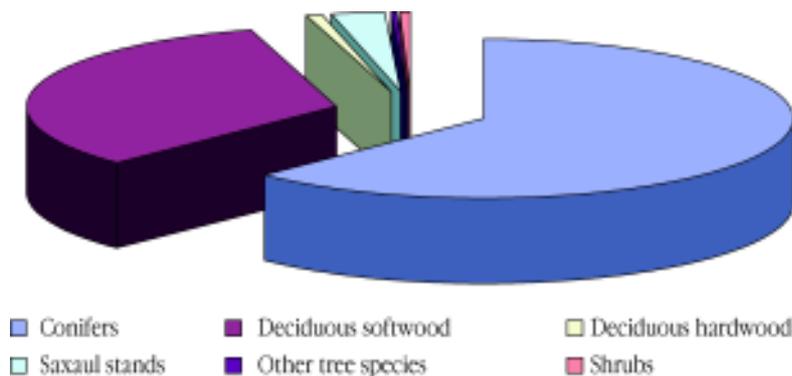
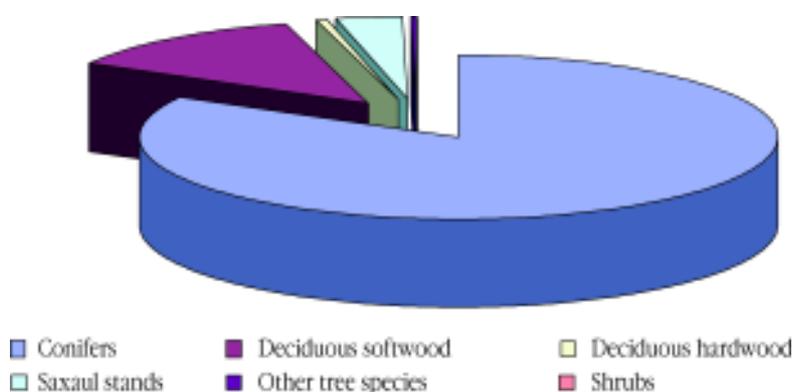


Figure 3.10. Stumpage Value of Standing Timber by Type



### Charges for non-timber forest resources

- 3.69 Charges for secondary forest products and non-timber forest uses are levied from forest users at rates approved by oblast representative authorities called “Maslikhats”. Compared to stumpage charges, charges for non-timber forest resources are based more closely on the old Soviet system. They are calculated according to the value of the labor and other inputs needed to protect, renew and expand the resource. The labor costs are for activities such as improving soil quality, restoring vegetation cover, managing fires, and taking resource inventories. Renewal costs are meant to cover plantation establishment, site preparation, and so on. These base fees are then multiplied by coefficients that reflect differences in accessibility, yield, resource concentration, and other factors. The prices are constrained to be less than 20 percent of the average market price of the harvested product. Apparently, most of the revenues from these charges go to local budgets.
- 3.70 As with stumpage charges, this system is extremely cumbersome. Examination of the charges for non-timber forest products approved by Maslikhats in a number of oblasts reveals significant variation, suggesting that the pricing methodology is not applied consistently. Further, this system is even farther removed from the market than the stumpage charges. It provides little incentives for the forest authorities to reduce costs, and may even provide incentive to inflate them. It reduces the revenue-generating potential of non-timber forest products, and does not guarantee access to local communities. As of now, there are no established procedures for levying land taxes on the use of designated forestlands for agricultural purposes, such as grazing. This is primarily because the taxes are supposed to be based on the value of the land, but the forest areas designated for agricultural use have not been valued. For the use of wildlife and fish resources in forests, the rates are established by central government decrees and are supposed to be based on management costs and market prices (typically 32%-47% of market rates).

Additional fees of US\$150-200 are paid for “hunting logistics officers”, which makes this activity potentially quite lucrative. Wildlife fees were increased in 2002, but taking into account the devaluation of the tenge, they have actually decreased in dollar terms.

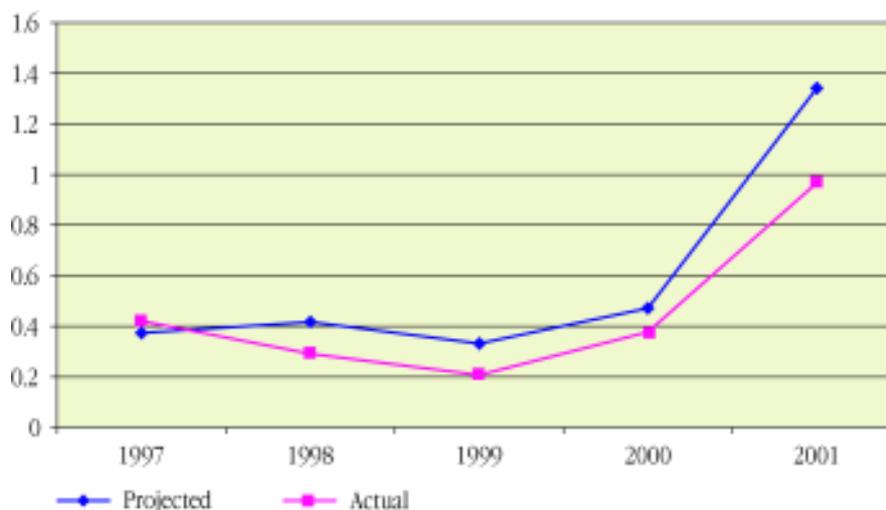
3.71 The wildlife prices for Kazakh citizens are lower than for foreign citizens. However, there is some evidence that prices are still unaffordable for the local population because harvesting is regularly below annual quotas, receipts of mandatory payments are inadequate, and there has been an increase in poaching. Of course, these could also be the results of the re-channeling of all wildlife revenues to the national budget since 1999. This gives the local population little incentive to conserve the resource, and little incentive for local authorities to collect fees. In fact, collections have declined 16 percent from US\$540,667 in 1998 (66% from foreign trophy hunters) to US\$454 667 in 2001 (in 2001 dollars). The pricing system could be made less cumbersome, revenues increased, and local ownership increased by devolving management responsibilities to the local level and, as with timber resources, making the system more market-driven. The rights to hunt trophy species could be auctioned. Of course, the GoK should continue to certify the capacity of hunting tour operators. Charges for the use of protected areas for activities such as research, culture, tourism, and recreation are set based on estimates of the cost of their protection and renewal. Maximum visiting capacity restrictions are supposed to be set based on expert assessments, however in practice neither the forest administrations nor the protected area management has the financial resources to fund them. This process could also be enhanced by setting fees and estimating revenues based on an assessment of market demand (possibly taking into account some non-market values).

### ***Financial Management***

3.72 Chart 3.1 shows the revenue flows for “forest receipts”. However, there is no official budgetary category for forest receipts per se, and these flows also include revenue from several taxes, duties, and other mandatory charges, as well as non-tax proceeds. Most of the proceeds are generated by activities of the State Administrations for Forest and Wildlife Protection and national parks. The largest share of these proceeds is generated from charges for the use of forests, wildlife and protected areas.

3.73 Although in the past forest use charges were largely retained by the leskhozoes as an additional source of funding for their activities, recent changes to the budget legislation have resulted in the channeling of all natural resource charges to the central budget. This has increased the transparency of flows and the control by the central government. However, it completely precludes providing incentives to local authorities for improving the collection of payments. This has resulted in the sector’s failure to

**Figure 3.11. Forestry Receipts (constant 1995 US\$ mil)**



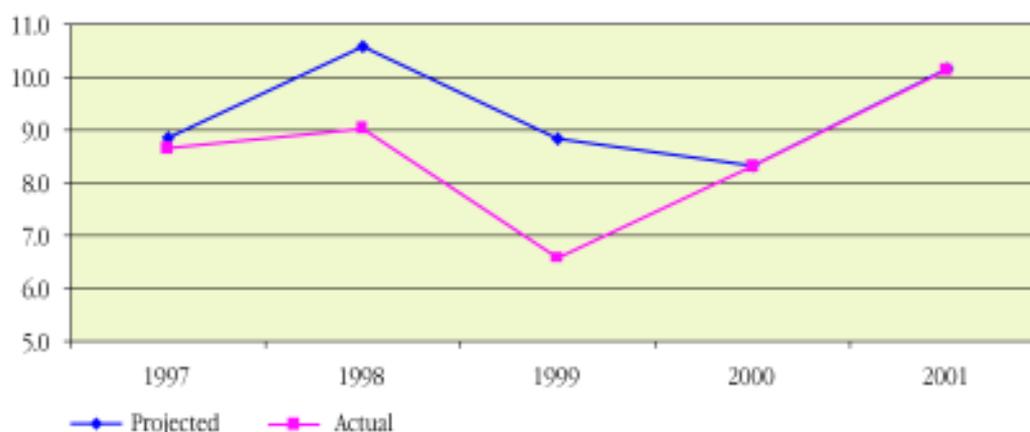
achieve projected receipts from stumpage charges and the low efficiency of game resource use in recent years. It has also been reported that non-timber forest product fees are not being collected, and PA use charges have only been collected in the past two years (only fines for legal offences are levied). So, for example, agricultural enterprises and local communities have been using forest pastureland for free. Chart ? illustrates the dynamics of receipts from 1997-2001 and the gap between projected and actual receipts

3.74 The management of forests, wildlife and protected areas cannot be adequately financed without support from the central budget. The public good nature of many of the benefits of these resources provides a strong argument for this support (or, for global resources, support from international sources such as the GEF or PCF). Without these public funds, there would be under-investment from society's perspective. Strict earmarking of funds should not be encouraged. However, a balance should be struck whereby a percentage of receipts remain under the control of local Forest Administrations, protected areas, or even communities as an additional source of funding for their activities. This would provide an incentive for resource managers to increase the capture of user fees and improve the performance of the system.

**Table 3.3. Forest Management Revenues and Costs, 2001**

	Tenge mil	US\$ mil
<b>Annual forest revenues</b>		
Stumpage & other timber charges (fines, etc.)	177.6	1.2
Wildlife use charges & fines	52.5	0.3
Protected area use charges & fines	133.1	0.9
Sub-total	363.2	2.4
Taxes & duties on sales of forest resources	109.0	0.7
Total annual revenues	472.2	3.1
<b>Annual forest costs</b>		
Forest management costs	1,415.4	9.3
<b>Net annual government forest revenues</b>	<b>-943.2</b>	<b>-6.2</b>

**Figure 3.12. Kazakh Forestry Committee Budget (constant 1995 US\$ mil)**



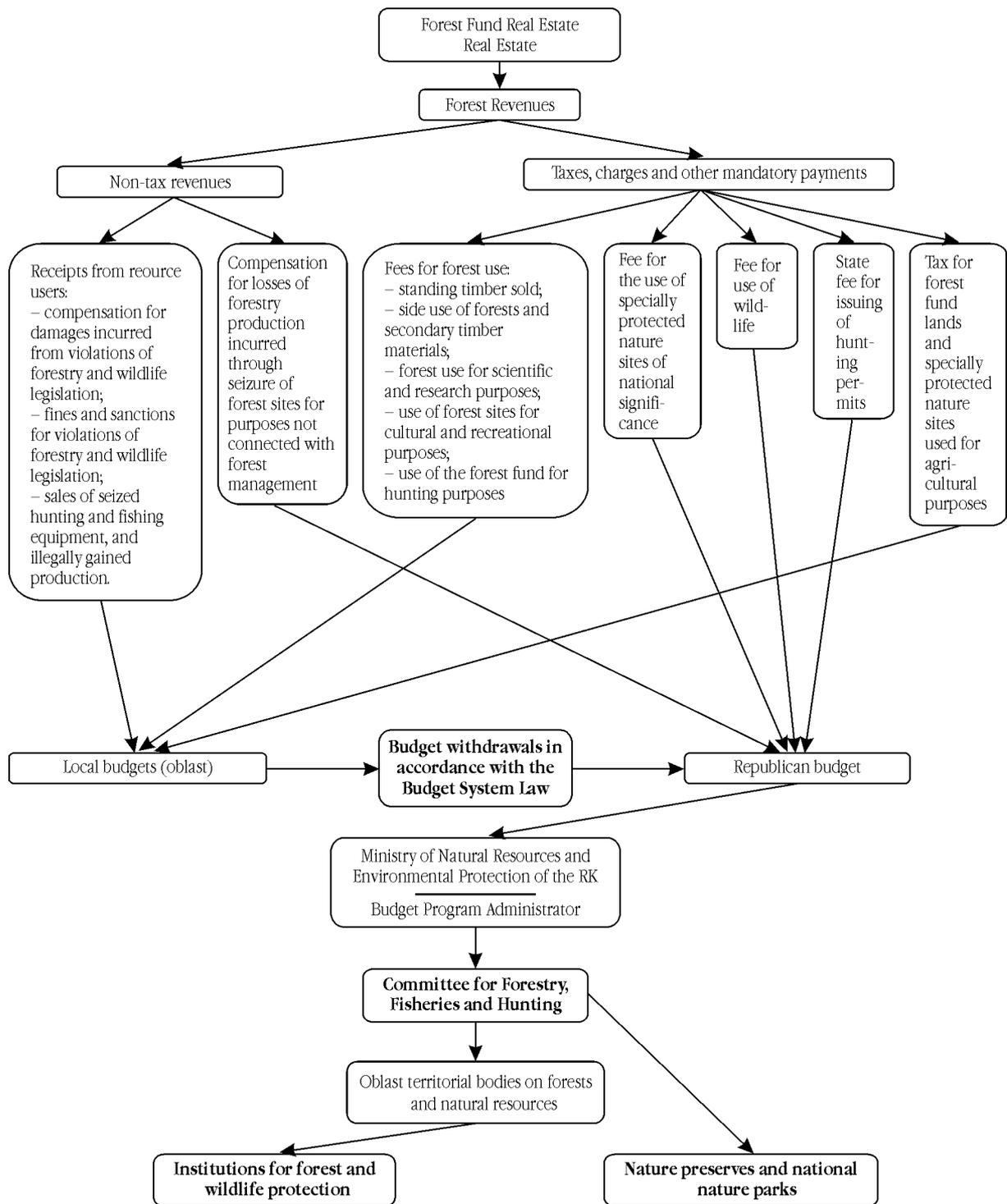
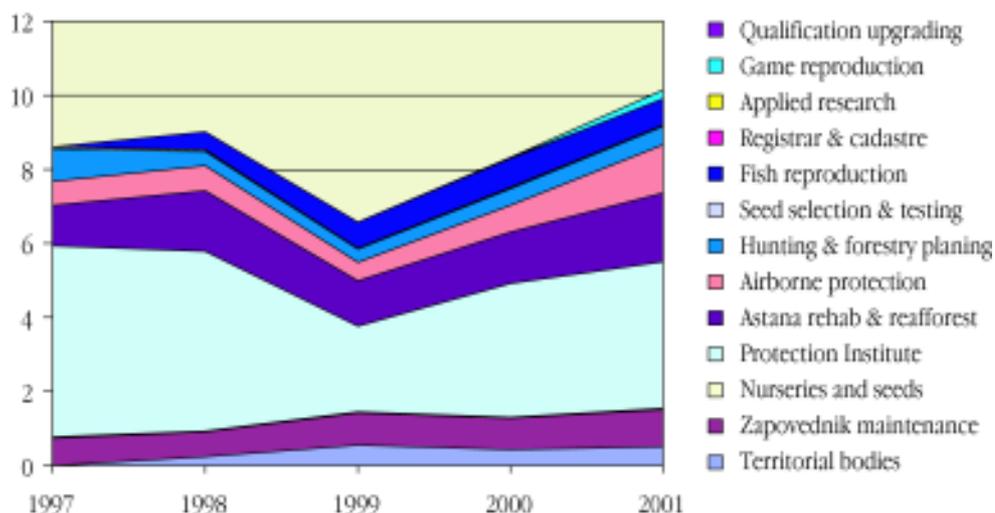


Figure 3.13. Kazakh Forestry Budget by Category (constant 1995 US\$ mil)



3.75 Allowing local authorities to generate some of their own revenue might also help to militate against some of the negative results of the current budget process. The process is so complicated and lengthy that program implementation is often delayed until April or May of the year. As a result, implementing organizations are frequently forced to risk commencing work without adequate financial support, forcing employees to work without pay for months. The delays also threaten time-sensitive management actions that depend biological, environmental and climatic conditions (e.g., forest fire protection, population inventories, planting).

There would seem to be considerable potential for increasing revenues generated from tourism in Kazakhstan. Currently, only 0.6 percent of the population is engaged in tourism. Opening protected areas for use in tourism would provide an opportunity to generate funds for conservation activities, and would help mitigate the threats to PAs by increasing employment in local communities. Unfortunately, it seems that no data is available on revenues generated from tourism. This makes it difficult to assess the size and growth of the sector. It is recommended that such data gaps be filled in the future.

#### Box 3.4. The Total Economic Valuation of Forests: The ECA Experience

The World Bank recently helped Georgia and Romania carry out a total economic valuation (TEV) of its forest resources. The Georgian and Romanian forestry sectors have undergone similar experiences to that of the Kazakh forestry sector over the past decade, with a lack of appropriate forest maintenance operations, a substantial increase in illegal harvesting activities, a loss of timber markets, and a collapse of the wood processing industry. One difference is that Romania undertook a partial restitution of forests to private landowners in 1991, and is considering expanding the program.

TEV is a method used to identify and estimate the monetary value of all economic benefits that a society derives from its forests. As such, TEV extends well beyond the scope of traditional analyses of forest values that concentrate almost exclusively on timber, and also accounts for a large variety of other products and services provided by a forest system. This more comprehensive approach to the valuation of forest resources enables TEV to inform land-use planning and forest management decisions by indicating the full benefits and costs to society of alternative management regimes and use and non-use strategies.

The total economic value of a forest is the sum its use values (UV) and non-use values (NUV). Use values are in turn divided into direct (DUV), indirect (IUV) and option values (OV), while non-use values include bequest (BV) and existence values (EV). Examples of the various use values include:

- Direct Use: timber, fruits, nuts, mushrooms, medicinal plants, forage, hunting and fishing, tourism and recreation, genetic resources, and educational uses.
- Indirect Use: watershed and soil protection, climate control, and nutrient cycling.
- Option: future direct and indirect uses.

The total economic value of a forest is therefore derived as follows:

$$\begin{aligned} \text{TEV} &= \text{UV} + \text{NUV} \\ &= \text{DUV} + \text{IUV} + \text{OV} + \text{BV} + \text{EV} \end{aligned}$$

The TEV approach attempts to determine all relevant linkages between forest values to identify tradeoffs between conventional market values and generally un-priced environmental services. While some uses or values will always be forgone for others, TEV explicitly determines these tradeoffs to help avoid policies that result in excessive environmental degradation and are not socially optimal.

Due to unavailability of data (no new data collection was undertaken), the Georgia TEV study was not able to quantify indirect, option or non-use values. Nevertheless, even excluding those values, the annual net value of sustainable timber harvests was estimated to be less than half of the conservatively estimated total value of US\$24.8 million for Georgia's forests. The policy implications of this are that Georgian society could derive much higher value from its forests and the Georgian government could obtain much larger revenues if the forest were managed to maximize the total economic value to society rather than simply the value from timber harvests.

The Romania TEV study was able to quantify the most important direct (except tourism) and indirect use values, but not the option value. It demonstrated that the annual value of timber of US\$106 million was only 3.4% of the TEV, while the indirect use value was a much higher US\$3 096 million, or fully 99.2% of the TEV. Policy simulations based on these results generated the recommendations that Romania should not consider further forest restitution without first reforming the sector, and even with reforms, not all formerly private forest land should be returned, but only a maximum of 30 ha per owner.

### Box 3.5. Owens (Dry) Lake, California

Owens Lake was a perennial lake at the terminus of the Owens River that held water continuously for over 800,000 years. Until the early 1900s, the lake fluctuated between 7-15 meters deep and had an area of 280 km<sup>2</sup>. But due to irrigation by local farmers and changing climatic conditions, Owens Lake began to shrink. Then, beginning in 1913 the City of Los Angeles started withdrawing water from the Owens River, and by 1926 Owens Lake was dry. Since then, the dry lakebed has produced enormous amounts of windblown dust that contains salt as well as arsenic, nickel, cadmium and other carcinogens (by one estimate 900,000-8,000,000 tons per year). This dust has been tracked by satellite to distances of 250 km, has been linked to respiratory health problems, and has decreased visibility at the China Lake Naval Weapons Center, causing the suspension of operations and resulting in millions of dollars in economic losses.

Because the dust storms from Owens Lake violate US Environmental Protection Agency standards, Los Angeles has been forced to mitigate the dust emissions. After 20 years of study and debate, an agreement was hammered out in 1999 that required Los Angeles to halt the dust storms by 2006. The solution: A massive irrigation system saturates the ground, and salt grass is cultivated to hold the soil in place. The irrigation system consists of large sprinkler heads that keep the soil moist and provide small pools for birds during the windy season of September to June. Meanwhile, fields of salt grass are being planted on small areas at a time. It is estimated that these controls will only be needed on a small portion of the dry lakebed (40-55 km<sup>2</sup>). The total cost of the project is estimated at over US\$200 million. With only half of the dust-control measures in place, local residents already report that air quality has improved, and there has been a sizeable increase in the bird population.

### Box 3.6. Concession Auctions: The Experience of Cameroon

As Africa's largest wood exporter, Cameroon generates substantial income from its forest resources. However, logging has been poorly regulated. Until the mid-1990s, logging permits were awarded through an opaque administrative process linked to deeply entrenched patronage. The system was prone to corruption and was generally insecure for long-term investors. Permit holders were not required to adhere to forest management plans, and there was little enforcement of basic logging regulations. As a result, loggers built roads deep into the forest. Furthermore, the five-year licenses provided no incentive for long-term care of forest resources.

In 1994, Cameroon's executive branch brought a new forestry law to parliament that provided for the auction of forest concessions on the basis of per-hectare bids by pre-qualified bidders. The law also requires management plans and the allocation of half the revenues to local governments and communities.

Thus far, progress has included:

- *Improved transparency.* Consultations with stakeholders have intensified. Newspapers publish details describing which companies are authorized to operate in which locations. There is widespread use of independent observers. Cameroonian and international NGOs are contracted to assist in verifying concessionaire compliance with logging regulations.
- *Higher prices and increased revenues.* The average annual area fee per hectare increased by more than forty times, from \$0.14 in 1996 to \$6.00 in 2002. The average fee was also four times higher than the Government's reservation price. Annual forest revenues increased from less than \$3 million in 1995 to more than \$30 million in 2001. Revenues to local communities increased from negligible levels in 1998 to \$8 million in 2001.
- *Gradual exit of short-term speculators* and increase in long-term investors, with a positive impact on high value-added industry and local employment.
- *Stronger commitment to biodiversity conservation*, including the creation of new protected areas and ongoing negotiations on conservation concessions with international NGOs.
- *Introduction of the first legal framework for community forestry* in Central Africa, including priority access to forest land secured by local communities.

## E. Forest Fire and Pest Risks and Risk Mitigation

### *Background*

- 3.75 The climate of Kazakhstan is extremely continental. The North of the country is characterized by cold and long winters, and dry, short summers. The danger of range and forest fire increases significantly during summer droughts that are often accompanied by dry winds and dust storms. These fires are similar to those in winter rainfall areas in other parts of the world (Australia, US and the Mediterranean) and are part of the overall ecology of the forest zone. Although forest fire policies are widely debated in most countries, such fires and rangeland fires are controlled. This is also the case in Kazakhstan. However, during the last decade a number of events occurred that have increased the incidence, risk, and effects of forest and rangeland fires in the country. The second major, albeit lesser, factor is the threat to forests and rangelands posed by pests and diseases.
- 3.76 Following the post-soviet economic crisis and deficit of funds allocated for forest fire-prevention and maintenance activities, capacity of the forest fire services weakened significantly, areas of the forest fund protected by the Aerial Fire Protection Service have decreased, and statistics of discovering and extinguishing fires deteriorated sharply. This led to a significant increase in the number of big fires not controlled by the forest protection system, and increased costs for extinguishing and fire damage control. This chapter discusses these trends, details current policies, and suggests future actions for better managing the risk of fires, pests and diseases.<sup>15</sup>

#### **Box 3.7. The role of the Forestry Committee in Fire Management**

Every year, the Forestry Committee issues an order on carrying out forest fire-fighting in Kazakhstan. Based on this document, follow-up orders are issued by oblast offices overseeing forest and biological resources, national parks and reserves. These orders contain numerous attachments as well as local decisions of oblast, rayon, and local administrations (akimats) for appropriate preparations for the “fire-dangerous season” and fire-prevention activities in the regions and at timber enterprises. Approval of all mutual arrangements with oblast departments on timber and biological resources, state offices, reserves, and national parks is required. These arrangements include:

1. mutual agreements between the government, forest enterprise, and (family) farms located in areas adjacent to forests on assisting in fire-controlling measures with human resources, transport and other equipment.
2. Orders issued by oblast forestry departments and state institutions, prohibiting or restricting access to the territories of timber enterprises (which may include erecting of barriers) during the high risk Period.
3. Fire watch/monitoring schedules drawn up for timber enterprises and forest areas.
4. Fires stations put on a state of alert and ensured that they are stocked up on fuel, and equipped with vehicles, tractor machinery with trailers, fire-extinguishing equipment, etc.
5. Plans drawn up and agreed with respect to aerial support in protecting forests against fires.

The Month-long campaign in preparation for the fire-dangerous season includes: a) addressing specialists of timber enterprises through mass media (radio, press, television); (b) public-awareness events, discussions with schoolchildren, and the population; (c) setting up barriers, posts, panels, and mineralized belts.

### *Forest Fire Management*

- 3.77 The current fire management policy in Kazakhstan calls for active suppression of all fires on the territory covered by the national forest (the so called “ Forest Fund” land).
- 3.78 Detection. Apart from on-the-ground detection by forest fire spotters and cooperating farms and villagers, fire spotting from air is considered the most mobile, organized and effective method in forests, especially in those regions of the country which are difficult to access, and is *a priority for development and improvement*. For example, in the early 1990's the aviation service discovered up to 80% of all emerging fire sites in the protected territory.

<sup>15</sup> Arkhipov, V.A., J.G. Goldammer, K.A. Khaidarov, and B.M. Moukanov. 2000. Overview on forest fires in Kazakhstan. International Forest Fire News No. 24, 43-48; Gvozdetzki N.A., and V.A. Nikolaev. 1971. Kazakhstan. 296 p. <in Russian>

### *Control*

3.79 The main approach to fire control in Kazakhstan comprises two methods for extinguishing fire, direct and indirect, depending on the type of impact on the burning process:

- The direct fire extinguishing method is mainly used to put out lower forest fires of medium and weak strength characterized by a comparatively slow (up to 3m/min) speed of fire spread and small (up to 1.5m) height of flare. In order to extinguish such fires, the flare is lashed by branches along the fire edge, and the fire edge is covered with earth, or filled with water or chemical pest-killer solutions. The direct effect on the edges of strong lower and upper fires is constrained by complex working conditions in the fire zone (high temperature, smoke) and risk to people's lives. In such cases, precipitation is triggered artificially by airplanes and helicopters dispersing (discharge, release) fire extinguishing liquids (water, chemicals). The direct forest fire extinguishing method is distinguished by relatively high work productivity with a weak burning intensity, a reduced amount of extinguishing effort due to spontaneous termination of burning at certain sections of the fire edge, and minimal increase of area covered by fire during the period of extinguishing. There are also some negative aspects: adverse working conditions at the fire edge, necessity of subsequent creation of a mineralized belt or prolonged guarding of the fire site, and a limited range of weather and forest conditions under which this method can be applied.
- In the past/on average, air services extinguish up to 60% of forest fires. At the same time they carry out aerial chemical treatment of places affected by extensive fire damage. A centralized system for efficient management of forest fire-fighting was formed within the structure of the aviation service. Air bases bid out contracts among air companies and enter into agreements for air services.
- The indirect method of extinguishing forest fires is based on the creation of protective belts and barriers along the path of the fire by moving away forest fuel, covering it with earth, burning out fire-prone materials, and chemical treatment for temporary prevention of burning. The traditional system for wildfire protection used in Kazakhstan includes establishment and maintenance of firebreaks around forest stands. There are also restrictions for agricultural and other activities in buffer zones (defense bands) around forests. Prescribed fires are not used in Kazakhstan, since they are officially forbidden.

3.80 The creation of such belts and barriers is carried out at some distance from the fire edge depending on the fire dynamics, working conditions, and availability of natural constraints for fire. Positive aspects of this method include, safer and more favorable working conditions, mechanized works, no need for additional treatment of the fire edge after the fire is terminated, simplicity in guarding, universal nature of the method, and a wide range of application.

3.81 The negative aspects include, loss of areas due to retreat from the fire edge when creating protecting strips and burning, and complexity in localization of forest fire (choice of location for protecting and supporting strips, time of burning).

3.82 Prevention. Planning the protection of forests from fires is based on the concept of preventative fire-protection in order to maintain the scope of the forest fund at the level essential for meeting the socio-economic and environmental requirements.

3.83 Fire management practices. The traditional system of wildfire protection used in Kazakhstan includes establishment and maintenance of firebreaks around forest stands. There are also restrictions on agricultural and other activities in buffer zones (defense bands) around forests.

3.84 Financing. Protection of forests from fires as well as forest pathology study of the damaged sections is financed from the state budget via the system of state forestry authorities. The Forestry Committee requests Parliament for a budget allocation for all forestry activities, including land and air protection of forests from fires, diseases and pests.

The budget is based on a calendar year and is approved at the end of each year. Once the funds are allocated, timber enterprises undertake fire-preventive measures: purchase machinery, equipment, fire extinguishing devices, establish relations with forest areas and cordons. Forest protection is based on a strategy of combining all types of forest fire prevention measures targeting a high efficiency rate in discovering fires.

**Table 3.4. Classification of fire risk in Kazakhstan** (after V. Arkhipov)

<b>Danger Class</b>	<b>Groups of Forest Types, Planted and Deforested Territories</b>	<b>Main Fire Types and Their Origin</b>
<b>1. Very High</b>	Coniferous saplings. Logged sites of dry and fresh pines, larch, fir and grassy cedar forests, bushy broad grassy silver fir forests. Dry and rocky pine forests. Damaged and dying tree stands (dead dry stands, sites of storm debris and wind falls, unfinished harvest sites, slash, insect-damaged stands).	Surface fires during the whole fire season. Crown fires occur on sites with high fuel loads.
<b>2. High</b>	Young pine forests, especially with pine undergrowth. Periodically dry larch forests. Cedar forests on country rocks of southern slopes. Dry growing conditions of flood-plain forests.	Surface fires are possible during the whole fire season. Crown fires occur during the phase of highest fire intensity.
<b>3. Medium</b>	Continuous harvest areas of coniferous forests in moist and wet sites. Dry fir forests, fresh larch and fir forests, wet pine forests. Mountainous-valley silver fir and fir forests. Cedar forests of remaining types of forest. Fresh growing conditions of flood-plain forests. Radical and derivative fresh birch and aspen groves and their cut sites.	Surface and crown fires are possible during the peak of the summer fire season. In mountains, forest fires occur during spring and autumn dry spells.
<b>4. Low</b>	Wet pine forests. Wet dark-coniferous taiga forests. Wet larch forests. Mossy-grassy silver fir forests, wet fir forests. Mossy fir forests. Bushy, dog-rose and aspen fir forests. Apple, birch and aspen groves. Wet growing parts of flood-plain forests. Black saxaul.	The occurrence of fires is possible during dry spells in spring and autumn. During the summer, fire occurrence is possible in pine forests
<b>5. Very Low</b>	Sub-alpine coniferous forests. Cedar forests on bare rocks. Wet birch and aspen groves. Damp poplar groves. Willow groves of all types. All types of saxaul (except black saxaul).	The start of a fire is possible only under extraordinarily unfavorable conditions.

### ***Resources, Institutions and Methodology for Fire and Pest Management***

3.85 Since humans are the main cause of forest fires, public policy on wildfires comprises public awareness and educational campaigns. The government is gradually transforming hunting and forest facilities into nature reserves and national parks. In 1998, Karkaraly National Nature Park was established, and in 2000, the Borovoye Timber Enterprise was transformed into a National Park called «Bourabai». In the same year the Markakol Ranger Station (in East Kazakhstan) was transformed into the Markakol Nature Reserve.

3.86 In 2000, the government set a moratorium on the industrial harvest of wood in all forests and groves of Kazakhstan. Wood harvest is permitted only on damaged sites for sanitary reasons. This regulation has generated two problems: deficit of wood fuel in the rural regions of the country and, as a consequence, a sharp increase in illegal cutting. Significant funding was made available in 2001 to rehabilitate the Band Groves along the Irtysh River and insular groves of Kostanai Province, which had been severely damaged by wildfires in recent years.

### ***Preventive Measures Against Fires***

3.87 Existing preventive measures against fires consist of fire-prevention awareness campaigns, educating the population on ways to handle fire in a forest, and the simplest methods of extinguishing fire:

- Orders are regularly issued by oblast departments “On Strengthening Forest Protection from Fires and Preparation for the Fire Dangerous Season”.
- Oblast and rayon akimats issue regulations “On Measures for Strengthening Fire-Preventive Protection of Forests in Oblasts and Rayons”.
- Extensive plans for extinguishing forest fires are elaborated by the Headquarters on Civic Defense, Department on Home Affairs, Emergency Office, and Rayon Home Affairs Departments, which stipulate participation of human resources, machinery and mechanisms from enterprises, organizations, farms and family farms adjacent to forests.
- Duty schedules listing responsible staff are prepared (and signed off on by the managers of enterprises) at all timber enterprises and oblast enterprises for the duration of the fire dangerous period.
- Routes are worked out for horse patrols at all inspections and posted at timber enterprises.
- Forestry Department and timber enterprises declare month-long activities for preparing for the fire dangerous season, followed by review of the preparedness results.
- According to the program of forestry departments, oblast and rayon akims make decisions on liquidating consequences of forest fires on the territory of oblast and rayon, and on preventing spreading of forest pests. Funds are allocated to forestry departments and timber enterprises for these arrangements from the following sources:
  - nature protection fund at oblast and rayon levels,
  - oblast budget
  - penalties for causing fires
- Department orders are issued on improvement of work of forest guards and on accreditation of forest guard staff; similar orders are expected to be issued in all timber enterprises of oblasts.
- Timber enterprises are required to organize voluntary fire brigades for the enterprises, family farms and other farms adjacent to the state forest fund.
- Forest guards are required to be equipped with transport: vehicles, motorcycles and horses attached to the enterprises.
- Specialists of departments and timber enterprises reach agreement with the Home Affairs Office, and according to the decisions of oblast, rayon and town akims must conduct joint inspections, preparedness checks of timber enterprises, and observance of all procedures and fire safety rules.
- Forest guard staff of timber enterprises are asked to carry out explanatory work on fire prevention measures with the population, timber workers, and schoolchildren both in person and through rayon and oblast newspapers.
- Public awareness campaigns are to be held with the help of the following means:
  - lectures, reports, talks, radio announcements, newspaper articles, television spots, installation of posts.
  - Care for mineralized strips is to take place.
  - New mineralized strips are to be created.
  - Cases of forest fires are to be passed on to investigating bodies and monitored, including the levied amounts and number of individuals brought to account.
  - Preparedness of fire stations (full strength, fuel stock, etc.) is to be checked.
  - Recreation, smoking and parking areas along the main roads are to be organized.
  - Decisions of oblast and rayon akims on fire-prevention measures are to be publicized.
  - Leaflets are to be issued, lectures, discussions, events in schools and clubs, with tourist groups and campers are to be held.
  - Targeted, painted placards are to be posted in public recreation areas, explaining the necessity of careful handling of fire in a forest during the fire dangerous season.
  - Rayon and oblast press to be involved in fire prevention measures, as well as local radio and television.

- Population is to be informed on the fire safety rules and current situation with danger of fires in the forest.
- Permanent exhibitions and showcases are to be organized, demonstrating significance of forests in economy, damage caused by fires, methods and means for fighting them at the offices of timber enterprises and schools.
- Patronage of school forestry and green patrols over certain sections of the forest fund to be organized.
- “Days” or “forest weeks” are to be held, interest groups like “Friends of Forest” are to be organized.
- Recreation and smoking areas along all roads located on the territory of timber enterprises are to be organized with the interval of 3-5 km, precautionary posts in locations often visited by people are to be set up.
- Barriers for regulating access to particularly fire-prone sections are to be set up.  
As experience shows, preventive measures against forest fires significantly decrease their number.

### ***Forest Pest Management***

3.88 Various challenges to Kazakh forests appear to have increased the risk of pests. The risk of pest outbreaks has increased in the coniferous forests in the Irtysh area in part owing to lower resistance of partly burned trees, in part to lowered water-tables (after larger fires). Other forests are, however less frequently and severely affected. Secondary pests, such as bark beetles, etc. further degrade burned wood, stored logs and, under certain conditions, stands of pine and other trees. In areas where broad-spectrum insecticides are used there is also the risk of secondary pests (i.e. pests that are normally controlled by beneficiary insects, but may emerge when the latter are eliminated after insecticide spraying).

**Table 3.5. Major pest problem in Kazakh forests since 1997**

Pine forests:	pine silkworm	36,600 ha
	star saw fly	11,900 ha
	pine noctuids	91,000 ha
Cut or stored wood	Capricorn beetles, bark beetles,	

- 3.89 Recent fire sites, where populations of secondary trunk pests (Capricorn beetles, bark beetles, etc.) reproduce, negatively impact coniferous forests. In order to strengthen legal protection of coniferous forests, the Government of the Republic of Kazakhstan took a decision to consider them in the category of protected forests (especially valuable forests), which means that they are not open for cuttings and should be taken care of.
- 3.90 Timely care and sanitary cutting of forests are important as they create an additional potential for interim forest use, contributing to the development of highly productive woods and recovery of plantings. Thus, the strategy for using forests, caring for plantings and improving sanitary planting, needs to be improved, as the current protection of forests from insect pests and diseases is not effective.
- 3.91 The affected area increased by 2.5 times from 1997 to 2000, while the need for measures to fight against insect pests doubled. In order to liquidate centers of pests and diseases, annual pest eradication campaigns are carried out on an area of approximately 50 thousand ha. There is need to restore and strengthen forest protection stations with qualified specialists.
- 3.92 Concerning personnel qualifications, at present nearly 30% of the administrative staff in oblast and state institutions responsible for forest and fauna protection have no special higher education, and there is a very small number of mid-level specialists and foresters. It is important to improve the level of special training for workers, and fully meet the demand for mid- and high-level specialists. For this purpose, it is necessary to plan and organize training for administrative staff with backgrounds in other areas with a 2-year training course set up in one of the higher learning institutions of the country, as well as short-term 1-2-month training courses for mid-level professionals and foresters.

- 3.93 Prevention. Stress reduction strategies have been difficult to implement especially in the northern forest as the forestry departments were fully preoccupied with fire control. At the same time some of the pre-conditions causing stress in forest stand are on the rise (i.e. fires, locust outbreaks, lowered water tables, salination etc.).
- 3.94 Treatment. Past pest management policies relied mainly on spraying with insecticides, often with organophosphates and dimilin, but the economic decline in the early nineties severely reduced access to such products, whereas more selective biological pesticides, such as *Bacillus thuringensis* were not known. Biological control, such as the use of beneficial insects covered an area of 50,000 ha.

### ***Involvement of Local Population and Forest Users in Forestry Development***

- 3.95 Forestry institutions cannot perform without forest users. Thus, the economic activity of forestry institutions must respond to new economic conditions, and be based on deliberate participation of the population in forestry performance, enjoying increasing interest from forest users to raise the productivity of forests and forest ranges.
- 3.96 Thus, one of the main objectives of timber industry staff should lie in research aimed at overcoming consumer attitudes to forests, and developing an understanding that conservation of nature is a responsibility of each member of society.
- 3.97 To meet this objective, the timber industry will need the assistance of the national and local authorities – who should be interested in growing employment, and environmental improvement.
- 3.98 Implementing plans related to forest recovery, planting, care and development of forest resources will increase employment and incomes of the local population, thus contributing to alleviating poverty in this area.
- 3.99 In order to achieve this goal, it is necessary to elaborate the procedure for handing over some areas of the forest fund for temporary long-term use, which will encourage active participation of certain people or groups of people in forestry arrangements and contribute to increased willingness of the local population in conservation of forest resources.

### ***Collaboration with Local Communities in Fire Prevention and Control***

- 3.100 According to the existing fire safety regulations for the forests of the Republic of Kazakhstan and the approved decisions of oblast akimats, timber and other enterprises, farms adjacent to forests and voluntary fire-brigades are required to take measures to put out forest fires with their own forces and equipment<sup>16</sup>.
- 3.101 Local communities also play a positive role in protecting forests from pests. Every year in spring, local communities, schoolchildren in particular, whitewash tree trunks to the breast level, thus protecting them from sunburns and pest migrations. Nestling-boxes for migrating birds are set up and are of great help in fighting forest pests. Gardeners and individuals tend to their plots, also contributing to the extermination of various forest pests. Sustainable grazing and cutting of grasses for hay are also some of the indirect factors protecting forests from fires.
- 3.102 On the other hand communities can also play a negative role, as most fires are caused by human negligence or arson. In early spring, for example, many peasants and farmers try to clean up their land by burning dry grasses that survived winter and emerged from under the snow, often causing fire to pass to forests.

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<sup>16</sup> If forest fires cannot be quickly put out with their own forces and there is a real threat of fire spreading into wider areas, the non-military units of civil defense and/or units of the National Army may be requested to participate in fire control by an order of the Cabinet of Ministers of the Republic of Kazakhstan

- 3.103 Burning of perennial grasses, trees and bushes often comes together with burning of birds' nests and death of birds and animals. This is especially the case for riparian forests along rivers. As a consequence of fires, pests and diseases are developing on the burnt tree stumps. Unauthorized cuttings, takeover of lands, haying and poaching are also possible negative actions of the local population.
- 3.104 In Kazakhstan, the great majority of fires are caused by humans. There is growing recognition also, however that the cause for the severity of these fires may lie also in a management regime, which for planted forests, has supported an inappropriate species mix and build up of flammable material. Many other countries are struggling to develop other approaches to forest and fire management that are better adapted to long term ecological sustainability.

### **Box 3.8. Examples of Fire Fighting Episodes in Kazakhstan**

#### **Semipalatinsk (Eastern Kazakhstan)**

It is known that the fire on July 2, 1999, which covered a huge area at Semipalatinsk Timber Enterprise, was caused by careless use of fire by the population. The responsible person was never found.

Smoke was discovered by the person on tower duty at 01.45 p.m. Four fire engines, two tractors and a vehicle with twelve people were immediately sent to the fire site. Following the local plan, assistance was requested from emergency departments of the oblast, and from the Irtysh and Zhanasemey timber enterprises.

At 02.50 p.m. twelve fire engines from the fire station, fire engines from the Irtysh and Zhanasemey timber enterprises, 6 water carters, and 7 vehicles carrying 40 people arrived. By this time, the fire covered a significant area due to a strong wind. By 05.00 p.m. upper fires in two directions were localized.

At 08.45 p.m. the fire was extinguished and the forest guard was placed on watch.

Fire spreading to a significant area was caused by adverse conditions (strong wind), availability of a number of natural forest cultures, and underwood that contributed to a quick transition to upper fire, and complex local arrangements for fire fighting. The fire area measured 115 ha.

Fire extinguishing headquarters and the forest guard performed correctly and effectively in extinguishing the fire.

#### **Zhambyl Oblast (Southern Kazakhstan)**

In Zhambyl Oblast weather conditions during the spring-summer of 2000 were characterized by high temperatures and insufficient precipitation. Some days temperature reached +42°C. Preconditions for forest fires were caused by prolonged drought, reduced grazing in recent years in the areas adjacent to forests led to piling of dry plants, insufficient material and technical equipping of timber enterprises with fire extinguishing devices, absence of radio and telephone communication, and ignoring a wide range of fire-preventive measures (setting up and maintenance of mineralized strips, etc.).

On July 23, 2000 at 07.30 p.m. foresters of Oiyk forestry of Akkol state forest institution noticed strong smoke at the distance of 30-40 km from the village of Akkum. On July 24 at 10.00 a.m. the forest institution started to extinguish the fire. Fire-fighting Headquarters were set up, headed by the rayon akim, head of the local forestry department and deputy akim of oblast; 4 tractors and 40 people were involved in extinguishing the fire on June 27 at 06.30 p.m. It covered 7,109 ha of forest area, of which 6,743 were sparse and not covered with forest areas, 366 with coming saxaul plantings and 6,331 ha – non-forest areas. In addition, this fire continued on into the territory of Zhambyl state forest covering 640 ha, where 240 ha were bushes and 50 ha saxaul.

### ***Issues for System of Forest Conservation and Protection***

1. The creation of sub-divisions such as national state enterprises may not be appropriate for a complex forestry system.
2. Whether the Forestry and Hunting Committee belongs in the Ministry of Natural Resources and Protection of Environment or set up as an independent unit (Committee or Agency), separate from fishery and Republican state enterprise may be considered.
3. The role of air protection and satellite communication in relation to cost effectiveness and budget allocation needs further consideration.
4. Radio communication may need to be reinstated in regional branches of forest departments, as its closure has significantly complicated the work of nearly all branches.
5. Special accounts may need to be re-opened for state institutions (timber enterprises). Funds from nature protection activities should remain there, i.e. the funds from confiscated transport, guns and ma-

chines seized from illegal hunting, unauthorized cuttings, and other illegal actions damaging forests. These funds would be spent on purchase of new machinery and incentives for the forest protection staff.

## **F. Reforestation, Afforestation and Plantations in Kazakhstan**

### ***Background***

- 3.105 At present, the issues of environmental protection have become exceptionally acute and the problems of protection, conservation and reproduction of forest resources (i.e. reforestation and forestation), in order to increase percentage of forest lands of Kazakhstan, have become especially important. Among the most important functions that forests carry out are:
- water conservation
  - soil conservation
  - sanitation and hygiene
- Particularly, the role of forests in Kazakhstan is significant in achieving the following:
- consolidating movable sands
  - preventing wind and water erosion of soil
  - stopping the spread of saline bottom depositions of the Aral Sea
  - protecting water bodies
- 3.106 The existing processes of desertification, and degradation of valuable forests, flora and fauna throughout the territory of Kazakhstan pose serious dangers.
- 3.107 Already today, the area of degraded agricultural lands exceeds 50 million ha; 3.6 million ha of arable lands are subject to wind and water erosion; and the lifeless areas of the exposed bottom of the Aral Sea, now covered with saline sand, total 3.0 million ha, expanding continuously and acting as a source for aerial transportation of salt, dust and sand.
- 3.108 Most of the water reservoirs, canals, and rivers of Kazakhstan have no vegetation, and natural growth of trees and bushes totals only 0.46% of the lands intended for protection of water sources.
- 3.109 As there are no plantations of trees around the new capital of Astana, the climate is unfavorable and the wind arduous. There is an obvious need for a greenbelt, which could cover a total area of 25,000 ha around Astana, and since 1997, the government has been undertaking efforts to create it (cf. examples of on-going projects below).
- 3.110 The forests of Kazakhstan suffered great losses in previous years. Fires destroyed 20,500 ha of forest areas during 1989-2000.
- 3.111 Based on the above, the forestry strategy of Kazakhstan needs to be fundamentally modified. It is essential to take urgent measures for:
- extended reproduction of forest resources
  - protection and improvement of qualitative properties of forestry
  - establishing proper oversight of economic activities
  - ensuring proper regime for maintenance of special protected territories
- 3.112 Such an approach complies entirely with the principles of the Biological Diversity Convention signed by Kazakhstan in Rio-de-Janeiro in June 1992 and with the International Desertification Control Convention.
- 3.113 Surveys, carried out by the Kazakh Forestry Research Institute, had indicated that with optimal economic and climate conditions, the area of plantations should cover 5.1% of Kazakhstan's overall territory.
- 3.114 At present, according to the data of the forestry-resources assessment, the forestry of Kazakhstan and the plantations that are under the control of land users total 11.8 million ha, i.e. forest lands make up

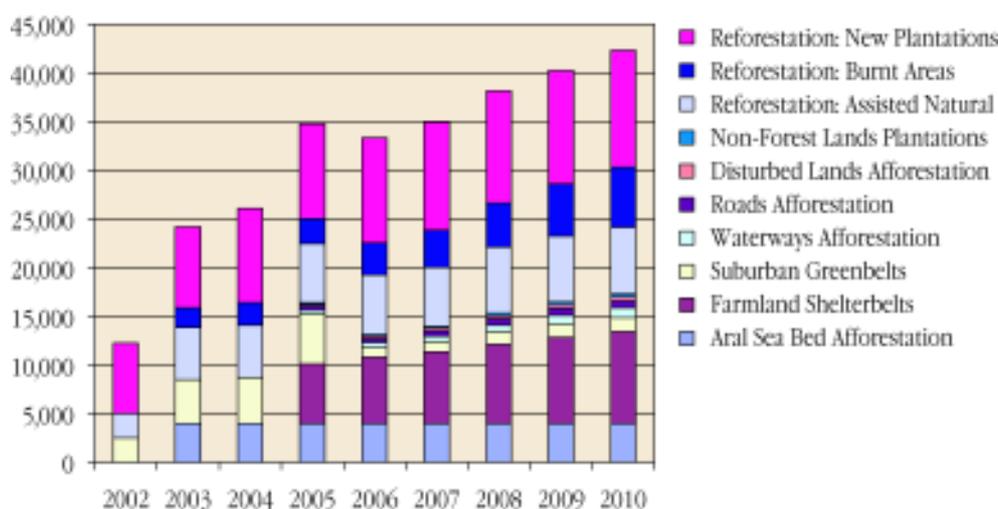
4.3% of total land area. The percentage of forest land was increased by sowing and planting forest specimens mainly in the middle of last century. The largest volume of forestry works was undertaken in the 1970's and 80's when the annual volume of reforestation ranged from 80,000 to 88,000 ha, including sowing and planting of forest specimens (70,000 – 76,000 ha) and natural growth (9,000 – 12,000 ha). The area of wood species planted in the forests as of January 2002 totaled 1,025,900 ha, while the area of wood species planted outside forests totaled 68,400 ha.

3.115 In addition to the reforestation of state-owned forest reserves, 112,000 ha of shelterbelt forests and 63,500 ha of protective plantations for the wastelands were created in Kazakhstan from 1965 to 1985. In the 1970's, the annual scope of works targeting creation of protective plantations of agricultural lands totaled 10,000.

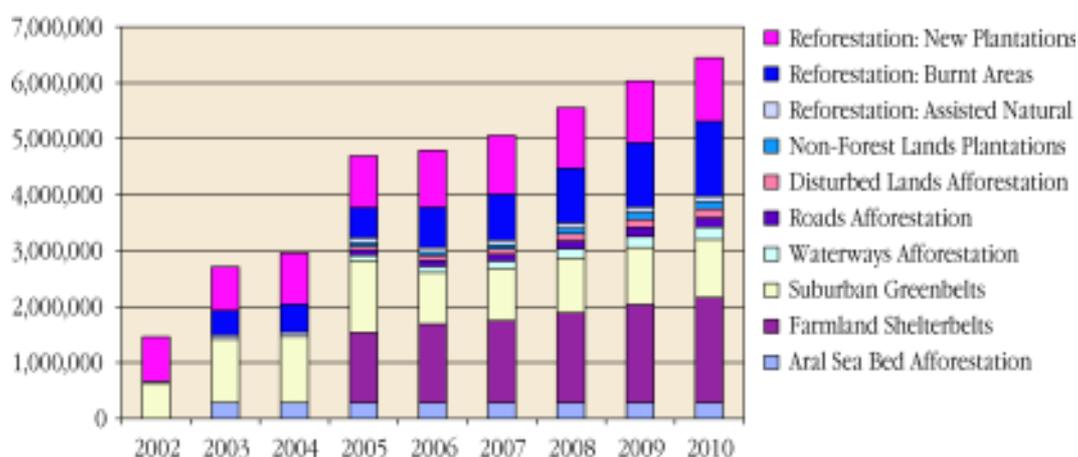
3.116 Later on, the scope of works for reforestation and forestation was reduced owing to the lack of funds. The works on protective forestation were greatly reduced in the mid-1990's. The reforestation of the state-owned forest reserves plummeted from 70,000–75,000 ha in the 1980's, to 5,800 ha in 2000, i.e. more than tenfold.

3.117 There was no financing for, and implementation of, most of the main provisions, schemes, concepts, feasibility studies and other program documents on forestation and reforestation that were developed to meet the directives and decrees of the government since 1989. See Table 1 for a list of the most justifiable long-term programs on forestry issues.

**Figure 3.14. Annual Area of Forest Rehabilitation Needs in Kazakhstan, 2002-2010 (ha)**



**Figure 3.15. Annual Cost of Forest Rehabilitation Needs in Kazakhstan, 2002-2010 (USD)**



### ***Procedure for Development and Approval of Projects***

- 3.118 The procedure for development and approval of programs is regulated by the Guideline for the Development of Programs in the Republic of Kazakhstan No. 789, approved by Decree of the Government of the Republic of Kazakhstan on May 25, 2000 (hereinafter referred to as the Guideline).
- 3.119 The Guideline provides a unified approach for development of programs in the Republic of Kazakhstan. It determines:
- concept and design
  - organizational and methodological base
  - general principles for formation of program projects
  - procedure for development of program projects, their co-ordination and approval
  - control over implementation of program projects
- 3.120 As the program for forestation and reforestation is being implemented, the Committee for Forestry, Fish Industry and Hunting Preserves under the Ministry of Natural Resources and Environmental Protection commissions a special organization (for example, one of the designing institutes like Kazles-project, Kazhyproleskhoz, etc.) to develop detailed working designs, on the basis of which specific measures determined in the program documents would be financed. The Government contracts design companies in accordance with the approved requirements, and specification/terms of reference.
- 3.121 The working designs are developed on the basis of detailed site-specific research works. The procedure for design and research works is still determined by a number of directives – and instructions issued by All-Union Design and Research Institute Soyuzgiproleskhoz and other similar organizations, following the standards of the State Forestry Committee, and the State Construction Committee, or working guidelines developed for a specific site in coordination with the client of the project for forestation or reforestation.
- 3.122 Instructions, directives and working guidelines for the research and design works determine the procedure of works from the stage of research and designing to the stage of submission and acceptance of the results. Content and procedures for development and approval of design estimates are regulated by the Provisions for determining the construction budget for enterprises, buildings and facilities; and a compilation of total estimate calculations and contract prices for the construction industry in the Republic of Kazakhstan approved by Decree of the Board of the Ministry of Construction No. 5-3 of May 28, 1996.
- 3.123 A completed working design on forestation and reforestation should be cleared by the state experts in architecture, construction and ecology prior to its formal approval.
- 3.124 In turn, the design company is responsible for carrying out field supervision of works and their compliance with the design vis-a-vis technology, quality, scope and terms. The procedures for supervision, reporting, commissioning and acceptance of results are stipulated in the Provisions on field supervision for implementation of forestry-related projects and protective plantations, and the Provisions on the designer's responsibilities concerning the oversight over construction of enterprises, buildings and facilities and major repairs (Construction Standards and Regulations RK SNIP 1.01.01.01-93).

See Table 2 for the list of technical directives, instructions and working regulations guiding the working designs for forestry to be used in accordance with the contracts between the design companies and the client, i.e. the Committee for Forestry, Fish Industry and Hunting Preserves under the Ministry of Natural Resources and Environment Protection of the Republic of Kazakhstan.

Figure 3.16. Forest Rehabilitation Needs in Kazakhstan, 2002-2010 (ha)

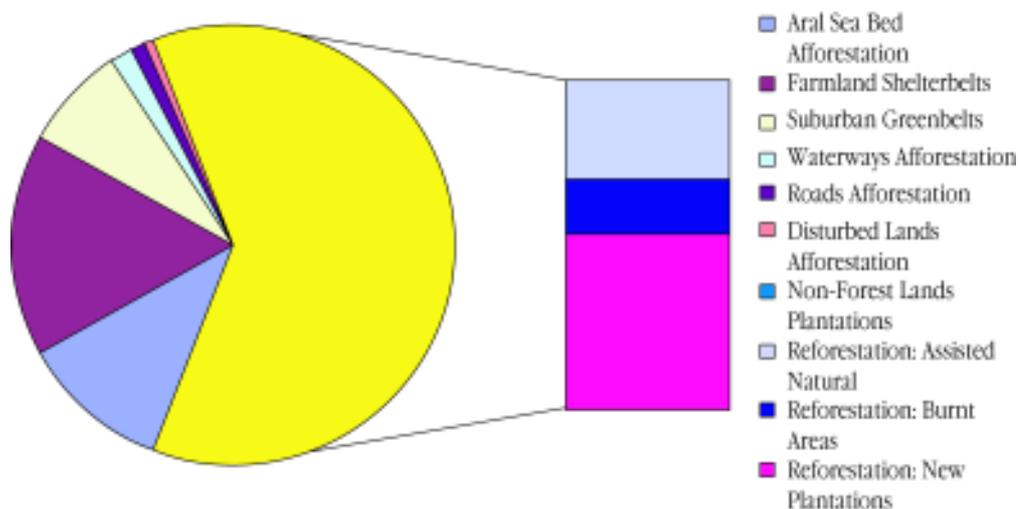
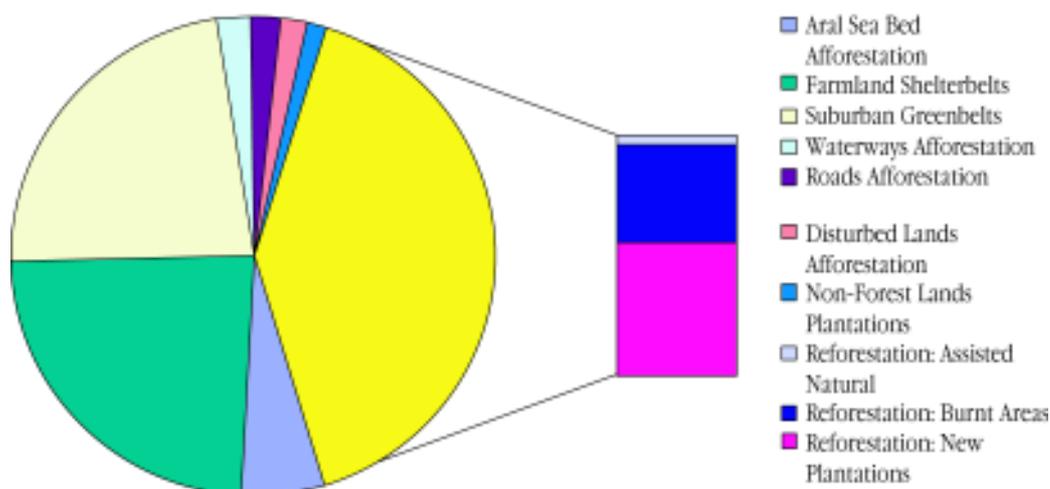


Figure 3.17. Forest Rehabilitation Needs in Kazakhstan, 2002-2010 (USD)



### ***Examples of Previous Projects and Analysis of Their Implementation***

#### ***Astana Green Zone for Sanitation and Protection***

3.125 In 1997, Kazhyproleskhoz Institute developed a Feasibility Study for creation of a sanitary protection zone around Astana in order to reduce the negative impact of winds and to plant verdure in the suburban steppe areas. The Feasibility Study was prepared at the behest of the Committee for Forestry, Fish Industry and Hunting Preserves under the Ministry of Agriculture of the Republic of Kazakhstan on the basis of the Decree of the State Commission for Relocation of the State Supreme and Central Authorities to the city of Akmola No 39-8/48c of July 18, 1996 "On the Development of Engineering and Transport Infrastructure in Astana and the Areas Which are Influenced by the City". Later on, this Feasibility Study became the basis for developing the working designs for separate plantation plots in Astana's green zone.

3.126 Working designs (with a scale of 1: 10,000) determine the type and structure of the verdure plantations, technology, species, type of planting stock, arrangement of the works, contractors, required material, labor, machinery, and amount of funds tied to specific plots of the green zone.

3.127 During the period from 1996-2001, surveys and designs covered a total of 34,600 ha, allocating 14,600 ha of land for forestation. From 1998 through 2001, Zhaysyl – Aymak State Enterprise and other forestry

companies designed plantations for the total area of 8,200 ha. Kazhyproleskhoz State Enterprise supervised implementation of the projects aimed at creating a sanitary and protective green zone for Astana in 2001 and concluded that some of the projects were being successfully realized. Where the recommendations on agricultural methods for growing plantations and species were followed, the plots were in good condition. The poplars and willows that were planted in 1999 looked excellent. Height of the plantations was 1.5 – 2.5 m and the growth rate exceeded 1.0 m in 2000. The plantations of birches, elms, oleasters and currant looked good. The plots where the soil was treated in a timely manner, were in especially good condition. The survival rate of plantations was uneven by plots and years of planting (from 25 to 100%). The low rate of safety was a consequence of deviations from the specifications for preparing the soil, volume and quality of the servicing works and species, untimely financing, lack of qualified labor, high-quality planting stock, and unfavorable weather conditions.

- 3.128 The types and scope of the designs, and distribution of costs for the main elements of the Astana Sanitary and Protective Green Zone Project are shown in Table 3 with an example of a detailed design for the plantations of parks and forests on the left bank of the Ishim River in the area of Astana's international airport, Phase 1 (2001).
- 3.129 Zhasyl – Aymak, the Republican State Enterprise of the Committee for Forestry, Fish Industry and Hunting Preserves under the Ministry of Natural Resources and Environmental Protection, is the main contractor for the Astana Sanitary and Protective Green Zone Project. The local population and farmers do not participate in the planting works.
- 3.130 Implementation of the projects for creation of the Astana Green Zone is of major ecological importance to improve the environmental conditions and create attractive recreation places for the people of Kazakhstan's new capital.
- 3.131 Creation of major plantations around Astana requires a complex technological approach because of unfavorable soil and climate conditions, involving significant costs.

*Developing Industrial Plantations of Fast-Growing Wood Species Under the Main Provisions for Development of Effluent Irrigation in Almaty*

- 3.132 This Project was commissioned by the Almatamelioratsia State Enterprise under the Ministry of Melioration and Water Industry of Kazakhstan and contracted to the Kazhyprovodkhoz Institute under the Ministry of Melioration and Water Industry. It has undergone the design stage and looks at the problem of utilizing effluent drains from the retaining Sorbulak Reservoir in Almaty (290 million m<sup>3</sup>/year) by creating industrial poplar plantations.
- 3.133 The Explanatory Note for the Project provides calculations for the scope of work and priorities for creation of industrial plantations, recommendations for prospective stocks of poplars (which are a major source of timber, up to 400 m<sup>3</sup>/ha by the age of 15 years), development of technology for the creation of plantations, including preparation of the territory and soil, planting, indication of types of planting stock, terms and methods of planting, servicing of the plantations, irrigation regimes, and measures against pests and diseases. The Explanatory Note also considers the issues of plantation operation, and environmental protection, and provides a calculation of the required means of production and funds by year until 2005.
- 3.134 The project includes recommendations and suggestions for setting up enterprises for the growing and processing of timber, their construction, and required equipment. See Table 4 for the feasibility parameters of the project. The works estimate is indicated in 1989 ruble prices.
- 3.135 In addition to the economic effect, the poplar plantations, if used together with Almaty effluent, could solve an existing environmental problem of effluent utilization, and could be of valuable use for sanitation of the urban-industrial environment and improving the natural steppe territories of the big industrial city. In spite of the economical and environmental benefits of the project, the work has been stopped.

### ***Experience From On-going Projects of Forest Amelioration Measures on the Exposed Bottom of the Aral Sea***

- 3.136 The Ministry of Forestry of Kazakhstan commissioned the Department of Scientific and Technical Progress and Development of Forestry to provide research on the vegetative properties of the soil on the exposed bottom of the Aral Sea, prepare a feasibility study, and establish forest amelioration station for phytomelioration of the exposed bottom of the sea, to be carried out by the Kazakh branch of the Kazgiproleskhoz Institute. The decision was made to comply with the Decree of the Council of Ministers of the Kazakh Soviet Socialist Republic No. 555 of November 29, 1988 – “On Implementation of the Decree of the Central Committee of the Communist Party of the USSR” and Decree of the USSR Council of Ministers No. 1110 of September 19, 1988 – “On measures for fundamental improvement of economy and sanitation in the Aral Sea region and strengthening water and land resources’ protection in its basin”.
- 3.137 The survey resulted in allotment of 365,000 ha for forest amelioration on the borders of dewatered areas, i.e. 32.1% of the surveyed land.
- 3.138 The Kzyl-Orda Forestry Production Enterprise of the Committee for Forestry commissioned the Kazhyproleskhoz Institute to develop seven detailed designs from 1990-1994. The designs dealt with the development of particular plots of exposed territory, defined for forest amelioration in the feasibility study. Each detailed design determined the types of forest amelioration works, technology required, species, type of planting stock/seed grains, arrangement of the works, contractors, required materials, labor, machinery, and funds. The funds were tied to concrete plots of the exposed bottom and phases of its development. The designs are shown on the plan (scale 1: 50,000).
- 3.139 See Table 5 for the types and volume of the designs and distribution of costs among the main elements of the example of a detailed design for forest amelioration works on the exposed bottom of the Aral Sea (Phase V, Kaskakulan Plot), which was developed by the Kazhyproleskhoz Institute of the Committee for Forestry under the Ministry of Ecology and Biological Resources of Kazakhstan in 1994. The costs are indicated in thousand tenge. The prices are as of January 1994 and are based on the design estimates.
- 3.140 The detailed designs for the forest amelioration measures for the exposed bottom of Aral Sea were implemented as funds were allotted from the state budget of the Republic of Kazakhstan. The design company – the Kazgiproleskhoz Institute – carried out field supervision in 2000-2001, which revealed considerable deviations from the design and unsatisfactory results.(see table 6).
- 3.141 On-going projects on forest amelioration on the exposed bottom of the Aral Sea have been implemented by only 30%. Previous supervision and inventory of plantings shows that only 40% of the developed area produced positive results; the preserved cultures are of a low quality; and those contracted to do the work (timber enterprises) have significantly deviated from the design:
- Planting material (seedlings) is of low quality. The project envisaged use of seedlings grown from the seeds of the local arboreta forest adjacent to the afforestation sites. Instead, planting material and non-standard wildings (natural afforestation) with weak roots and big topping, imported from Taldykorgan Oblast, were used.
  - The planned planting schedule was not followed: instead of early spring planting, most of the planting was done in autumn; and the planting and sowing period, determined by the project to be 10-15 days, was significantly extended.
  - Planned methods of soil preparation were not used.
  - The machinery and equipment did not meet the standards, hence seeds were sown manually from a tractor instead of using specialized seeders, which led to blowing off of seeds from the cultivated fields. Machinery used for soil preparation and planting differed from those envisaged for the project, thus leading to low quality of these works.

- Innovation technologies envisaged for the project are not used and this prevents assessment of their effectiveness (sowing of a mixture of psammophyte seeds to sand-storage furrows, fastening by astringents, sowing of granular seeds, etc.)
- 3.142 Accordingly, due to insufficient financing as well as significant deviations from the plan, an important innovative project on afforestation on the exposed bottom of the Aral Sea, which is of an invaluable ecological significance, was not implemented, and it would be difficult to judge its effectiveness.
- 3.143 Due to the remoteness of afforestation areas from populated areas, participation of the local population in project implementation may be unrealistic, and the possibility of involving the local population in the growing of planting material was missed.

### ***Experience in Forest Recovery and Forestry in Kazakhstan***

#### ***Various Types of Forestry and Forest Recovery from 2002 to 2010***

- 3.144 As was noted in Section 1, forest recovery and forestry in Kazakhstan was carried out on vast areas in previous decades. Forest specimens and protective plantings (state forest belts) make up 1,094.3 thousand ha (0.04 %) in the forest fund, protective forest belts on the lands of agricultural enterprises, 170 thousand ha, and nearly 30% of automobile and railway roads of the Republic of Kazakhstan are secured by artificially planted forest strips.
- 3.145 However, in the last 10-15 years there has been a reduction in forest recovery works by more than 10 times, whereas protective forestry has been virtually terminated. Planned works have not been implemented during this period. At the same time, there is a significant experience of successful projects of forest recovery and forestry in Kazakhstan.
- 3.146 One of the positive examples of planting sanitary protective green zones around towns in the steppe and semi-desert zones was the planting of the area around the suburban water reservoir near Shymkent from 1963-1965, and the sanitary protective green zone of Astana, which is has been planted since 1997. Green zones planted in the 1970's around other settled locations in semi-desert and steppe zones (towns of Kzylorda, Yanykurgan, Uzen, Guriev, Alga, Ekibastuz, Akshiy and others) are in bad condition at present, have low safety rates, and are partly disappearing. The latter is mainly caused by significant deviations from original project design for soil preparation and melioration measures, lack of irrigation, and as a result of insufficient financing.
- Below is a summary of several specific positive forestry projects.

#### ***Forest Belt on the border with the Moinkum Sands***

- 1.147 One positive examples of forestry in a desert zone is the State protective forest belt on the border with the Moinkum sands, as the result of the following projects:
- Scheme for Establishing a State Protective Zone on the Border with Moinkum Sands, Saratov Branch of State Design Institute "Soyuzgiproleskhoz", 1966;
  - Technical Working Project on Establishing a State Moinkum Protective Forest Belt in Zhambyl Oblast, Kazakh Branch of State Design Institute "Soyuzgiproleskhoz", Tier I – 1968; Tier II – 1970.
- 3.148 Reports from Kazakh specialists between 1972 and 1980 demonstrate that during the 14 years from 1967 to 1980, 4,008 ha of protective State forest belt was planted along the Moinkum sands with a total length of 128 km. At present all plantings in the area are covered with forest. Mostly they are in good or satisfactory condition, and fulfill their function as the south border of the Moinkum sands, preventing dust and sand being carried to the adjacent agricultural lands. The largest and most visible effect is observed in the village of Akyr-Tyube where moving sands were stopped by the forest belt at the distance of 150-200 m from the main national highway for Almaty-Tashkent. Low elm, planted in the State Forest Belt and aged 10-15 years, reaches 8-10 m in height and the stock of marketable

timber per 1 ha is up to 15-25 m<sup>3</sup>. Timber enterprises receive 3 – 10 m<sup>3</sup> of timber per 1 ha as the result of sanitary cuttings, and have sufficiently profited from the sale of firewood to the local population.

Figures 1 and 2 (imagery of supervision in 1980) show the good condition of the State Protective Forest Belt (SPFB) planted on the border of the Moinkum sands.

#### *System of Protective Forest Belts in Almaty Oblast*

1.149 Another positive example of protective forestry in a semi-deserted zone is the system of protective forest belts planted from 1969-1972 in Karoi massif (residential area) in Almaty Oblast as a result of the projects of the Kazakh Branch of State Design Institute “Soyuzgiproleskhoz” to protect wood land from the negative effects of wind erosion and dust storms. The stretch of planted forest belts runs for 239 km, with a planted area of 1,944.3 ha. Owing to these plantings, blowing sand and dust being carried over the river banks of the Kurta and Kaskelen were stopped. The positive impact of forest belts is evident in the villages of the railway stations Uzun-Agash, Kurtstroy, and Akshiy, where it improves the sanitary condition of the air basin and water sources.

#### *Protective Forest Belt “Vishnevaya Mountain – the Caspian Sea”*

3.150 The largest, long-term and very successful example of protective forestry in the steppe zone of Kazakhstan is the State Protective Forest Belt “Vishnevaya Mountain – the Caspian Sea” located on the territory of timber enterprises in West-Kazakhstan Oblast (Figure 3).

3.151 In 1973, the Kazakh Branch of the State Design Institute “Soyuzgiproleskhoz” designed a technical project on recovery, reconstruction and conservation of plantings in the State Forest Belt “Vishnevaya Mountain – the Caspian Sea” in Uralsk Oblast (at present West-Kazakhstan Oblast). The State Forest Belt was planted in the steppe, woodless zone from 1950 – 1970, and at present its length is 1,540 km and its area covers 24.2 thousand ha. The track of the State forest belt covers both banks of the Ural River within 1.0 to 10 km from the river bed. The construction of the State forest belt includes three strips (belts) of plantings with a width of 60 m, and an inter-belt gap of 100-200 m. By 1975, all forests of the State shelterbelts were re-classified as stocked forest lands, and now there is a definite forest environment there with wild animals and birds. For more than 30 years, the State forest belt has carried out the most important hydrological and water-protective functions, aimed at regulating surface drain and improving water conditions in the Ural River. The State forest belt also has a soil-protective, sanitary and hygienic, esthetic, and recreational significance. No snow or dust drifts are observed on the sections of roads along the State forest belt, compared to the sections not protected by plantings. In addition, plantings of the State forest belt serve as a seed base for the steppe protective forestry. Timber enterprises profit from secondary use and sanitary cuttings of plantings in the State forest belt. Specific economic benefits and positive changes in climate from the existing plantings of the State forest belt were not calculated, though the significance of such plantings in the steppe zone is difficult to overestimate.

#### *Failures and Future Prospects*

3.152 Forest recovery and forestry in the mid 1970's and 80's was mainly distinguished by low quality (rooting of plantings did not exceed 30-40%). The negative experience of forestry and forest recovery during this period was mainly caused by an unsupported over-estimation of the completed works. In such complicated, adverse conditions for forestry as in Kazakhstan, the success of plantings is directly dependent on the quality of soil preparation, use of durable zone planting material, implementation in the shortest possible timeframe, and timely maintenance. Successful forest recovery and forestry were destined to failure from the very start in certain timber enterprises with unrealistic targets for volume of forest works exceeding 5.0 thousand ha per year (sowing saxaul, forest melioration at the exposed

bottom of the Aral Sea), or establishing protective plantings on more than 1,000 ha per year, insufficient technical equipment for soil cultivation, sowing, and planting, and an absence of high-quality planting (sowing) materials, and use of imported (non-zoned, non-standard) seedlings and seeds.

3.153 At present Kazakhstan badly needs forest recovery and improved forestry. A study by the Kazakh Forestry Research Institute shows that taking into account climate and environmental conditions, optimal woodiness of the territory must amount to 5.1%, thus the area covered with forest must increase by 2.1 million ha. At present, development of forest recovery and forestry is mainly constrained by the absence of a sufficient material and technical base in the timber enterprises, and insufficient financing for these works.

3.154 Annex \_\_ and charts \_\_ provide details for estimates of the tentative scope of works and financial costs for forest recovery and forestry in three oblasts of Kazakhstan for the period till 2010 with the description of the “Forests of Kazakhstan” Program, and recommendations of the Kazakh Forest Research Institute.

### ***Aspects of Interaction in Forest Recovery and Forestry Among State Services and Private Initiatives***

3.155 State timber enterprises implementing forest recovery and forestry in Kazakhstan are financed from the state budget. At the end of the 1960's, a network of state forest melioration stations was created and charged with the responsibility for protective forestry, planting of state forest belts and green zones in towns and villages, field-protective forestry, planting of trees along rivers, and forest melioration on a contractual basis with agricultural enterprises, roads and railway services and other organizations interested in forestry on their lands. At present, owing to the fact that forestry works are almost non-existent, forest melioration stations have been closed or reorganized into timber enterprises.

3.156 There is no interaction between state timber enterprises and private initiatives in forest recovery and forestry in the Republic of Kazakhstan. Private initiatives in forestry (planting of gardens, berry plantations) is present in garden plots allotted to the population in the suburbs of big cities. Besides public organizations, large enterprises and high schools often initiate plantings in towns and villages. Municipal plantings are implemented by akimats and are financed from local budgets.

For example, the absence of financing suppresses private initiatives for commercial plantations of poplars at the wastewater storage facility “Sorbulak” in the suburbs of Almaty (executor JSC Meray – Meray-Terek Ltd).

## ANNEX

### *Classification of Zonal Wild Fire Risks<sup>17</sup>*

The vast size of the territory of Kazakhstan has produced a great diversity in natural landscapes. Five major natural zones and wildland fire characteristics have been identified (Arkhipov et al. 2000).

- **High-mountainous landscape zone** consisting of three sub-zones: nival with eternal snow, alpine meadows, and high-mountainous coniferous forests. Fires occurring in the coniferous forests spread uphill and develop as crown fires.
- **Forest steppe landscape zone** consisting of two sub-zones: southern forest steppe and typical forest steppe. The forests in the typical forest steppe are frequently ignited by steppe fires. The forest-steppe zone is located at the limits of the West-Siberian Lowland and occupies the northern part of Kazakhstan (North-Kazakhstan, Aqmola and Pavlodar oblasts), i.e. about 10% of the territory of the country. These areas are characterized by intensive agriculture (grain, pastures, and grasslands for hay production) and large areas of wooded lands. Fires occurring on these territories cause high losses in the agriculture and forest sectors. Systematic wildland fire protection is therefore required by state forest and agricultural enterprises. Fires usually occur in the early spring and in autumn, especially in dry years. The basic causes of wildfires are agricultural burning and violation of the fire safety requirements. The steppe landscape zone comprises up to 20% of the total territory of the country. All steppe vegetation and the grain crops quite often suffer from human-caused fires, mainly from agricultural burning. The fires occurring in kovyl (*Stipa capillata* L. – «feather grass») and tipchak (*Festuca sulcata* – Hack) grassy steppe usually last long and spread over large areas. The fuel load of dry herb material on such sites ranges from 0.22 up to 0.38 t/ha. Fires start due to the negligence of users, agricultural burnings and dry thunder-storms. The rate of spread of a steppe fire is directly dependent on wind velocity. Flame heights usually reach 0.9-1.0 m in grass fuelbeds of 30 to 40 cm high. In the kovyl steppe, fire can spread against the wind at a rate of 5 to 10 times below the wind-driven spread rate. During such wind-driven headfire, a convective movement is formed, and the fire quite often «runs» along the tops of grass stands. When it reaches either a natural barrier or a mineralized strip (firebreak) it stops, and the fuel on the whole area burned over by the headfire gradually burns out.
- The Central Kazakhstan Low Hill Land is located in a woody zone of the northwest part of Sary-Arka (Aqmola Baian-Aoul of the Pavlodar oblast, Karkaraly of the Karagandy oblast). Wood and steppe vegetation, climate and relief of the region dictate the origin, distribution and development of wildfires, especially in hot, dry and windy weather. Control of fires is hampered here due to inaccessibility of the woody sites. At the same time, rocky ledges and the stony material act as natural obstacles to further fire spread. Fires in the pine forests of Sary-Arka represent a major factor influencing plantings and causing considerable damage to the forest economy. Afforested wood species here are pine (*Pinus sylvestris*) and birch (*Betula verrucosa* Ehrh.). Fire hazard and flammability are highest in the following forest types: very dry stony-rocky pine forests, dry stony lichen-pine forests, and dry cereals-berry pine forests. The average annual number of fires here is about 100; and the average area of a fire is 5.4 ha during an

<sup>17</sup> [http://www.fire.uni-freiburg.de/iffn/country/kz/kz\\_1.htm](http://www.fire.uni-freiburg.de/iffn/country/kz/kz_1.htm)

average fire season. The basic cause of forest fires here is the violation of the fire prevention rules by people (especially tourists). Lightning represents only a minor fraction of all fire causes. Coniferous trees occur as undergrowth and plantations. Their flammability is determined by the high fire hazard of coniferous stands, dryness of the climate and availability of a large area of combustible materials, from 9 to 30 t/ha.

- **The Band (Strip) Pine Forests** (Lentochnyie Groves) of Western Siberia and Kazakhstan are located in a steppe between the Irtysh and Ob Rivers. The forests are important for the protection of water resources, soils and the agricultural sector. The main afforestation species is Scotch pine (*Pinus sylvestris*). Fire hazard and flammability are highest in the following pine forest types: dry forest of high dunes, dry forests of sloping hillocks, topographic depressions and lowlands. In the indicated forest types, fires are even common in wet years. In the very dry year of 1997 some catastrophic fires occurred in the timber enterprises of Semey (Semipalatinsk), totalling 511 fires affecting the area of 58,893 ha. In the Band Pine Forests of the Pavlodar province, 316 forest fires burned 17,672 ha in the same year. The basic reason for forest fires is violation of the fire prevention rules. The island pine forests of Kostanai province are located as green islands among extensive unforested areas on flat terrain. The climate is arid with annual precipitation varying from 240 to 350 mm. The duration of an average fire season exceeds 180 days. These forests are exposed to frequent fires. For instance, large fires on the territory of Naurzum Reserve have essentially reduced the total size of forests. There is no natural regeneration on burned sites. Regeneration is found only occasionally in «saucer»-shaped depressions where pine, aspen and birch are regenerating. The remaining pine forests of the region also experience frequent fires. Despite the damages, pine forests represent favorite recreational places for people from the cities of Kostanai, Rudnyj, Lissakovsk; and tourists from other regions also visit the area. During the summer season numerous youth camps, recreation motels and tourist bases are functioning there.
- **Temperate steppe landscape zone** consisting of two sub-zones: northern grassland-cereal steppes and southern dry *tipchak-kovyl* steppes. The fire regimes of timber islands embedded in the steppe, depend on the fire conditions in the steppe.
- **Semi-desert landscape zone** consisting of two sub-zones: lowhill-foothill semi-desert and flat semi-desert. The main woody vegetation are the saxaul forests. The latter are fairly fire resistant as long as the undergrowth is controlled by small ruminants grazing. The semi-desert that covers the central part of the country (22 percent of the territory) represents the transitional zone between steppe and desert. Typical landscapes are hillock-sandy plains with wormwood-grassy and bushy vegetation. Under these conditions, wormwood-salsola (*Artemisia / Salsola rigida*) vegetation is characteristic and does not form closed grass stands. In valleys of the drying rivers and in crevices of hills there are small meadows. The climate is rather droughty: cold and low-snow winters and dry and hot summers. Fires occur frequently. Steadfast attention is required to protect the area from fires, especially in pastures and haymaking grasslands. The desert zone reaches central and southwest parts of Kazakhstan, between 48°N and 41°N. The deserts of Kyzyl-Kum and Kara-Kum (drainage basin of Syr-Darya river) and the southern Balqash region (drainage basin of Ile river) are sand deserts (Aral sands) and cover about 47 percent of the territory of the country. (*Artemisia-Salsola rigida*) deserts and *ephemerial-wormwood* deserts. The major forest type is the saxaul forests which are usually not affected by wildfires if underbrush is kept under control, usually by grazing and browsing livestock. If underbrush fuel is present, these forests can be damaged severely by wildfires. Tougai, the flood-plains forest of Central Asia, represent a separate class of woodlands and a microclimatic zone with its own particular fire regimes.

**Map 1**  
**Landscape Geographic Regions of Kazakhstan**

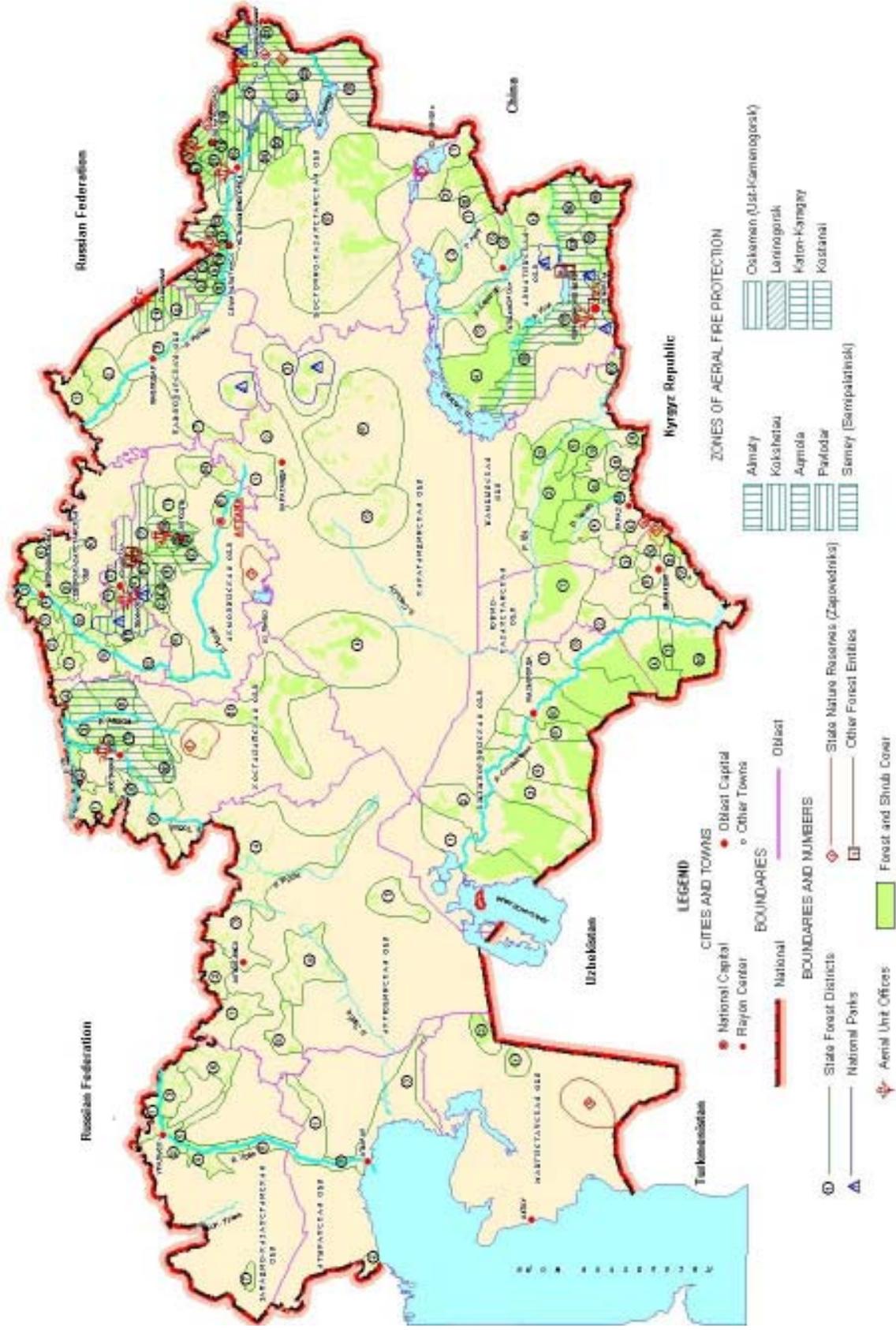


**Legend to Map of Landscape-Geographic Regions of Kazakhstan**

Landscapes Zones and Subzones	Physio-Geographic Provinces	
	Plains	Mountains
I. Temperate Forest-Steppe Zone	Ishim	
II.A. Temperate Steppe Zone – Northern subzone (herb-grass)	Ishim-Kulunda	
	Northern Kazakh Lowhills	
II.B. Temperate Steppe Zone – Southern subzone (feather-grass)	Urals	Southwestern Altay
	Upper Turgay	
	Southern Kazakh Lowhills	
II. Temperate Semi-Desert Zone	Uzen-Urals-Emba	Urals-Mugodjar
	Lower Turgay	Tarbagatay
	Dzhezkazgan-Ayaguz	Saur
	Zaysan	
III.A. Temperate Desert Zone – Northern subzone (sagebrush)	Guryev	Western Djungar
	Northern Aral	Northern Tien-Shan
	Betpak-Dala-Lower Chu	
	Balkhash-Ile-Alakol	
III.B. Temperate Desert Zone – Southern subzone (ephemere-sagebrush)	Mangyshlak-Ustyurt	Southwestern Tien-Shan
	Syr-Darya	



**MAP 3**  
**Forest Fire Protection System in Kazakhstan**





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