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NAMA on

Restoring degraded land through afforestation in the Republic of Moldova

NAMA proposal draft

March 2016

Republic of Moldova

March 2016

(NAMA proposal draft)

Brief text on UNDP and LECB…..

Technical Oversight and Guidance

Xxx

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Acknowledgements

XXX

Contract Information

XXX

XXX

XXX

Editor

XXX

Design

XXX

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Forward

To be completed after drafting and reviews

Contents

List of figures

List of tables

Executive summary

To be completed after drafting and reviews

Abbreviations and acronyms

|	
BAU	Business as Usual
C	Carbon
CDM	Clean Development Mechanism
CCO	Climate Change Office
GDP	Gross Domestic Product
GHG	Greenhouse gas
ICAS	Forest Research and Management Institute
INDC	Intended Nationally Determined Contribution
IRR	Internal rate of return
LEDS	Low Emission Development Strategy
LPA	Local Public Authority
LULUCF	Land Use, Land Use Change and Forestry
MDL	Moldovan leu (pl. lei)
MoEN	Ministry of Environment
Moldsilva	Agency Moldsilva
MRV	Measuring, Reporting and Verification
NCFC	National Centre for Forestry Consultancy
NEF	National Ecological Fund
NGO	Non-governmental organization
NPV	Net present value
NTFP	Non-timber forest products
SFE	State Forest Enterprise
SME	Small and medium enterprises
UNFCCC	United Nations Framework Convention on Climate Change

1. Restoring degraded land through afforestation

Forests are of great importance for sustainable development in the Republic of Moldova. They provide timber and non-timber forest products (NTFP), particularly for the rural population, as well as ecosystem services such as soil protection, biodiversity conservation, and carbon sequestration. The carbon sequestration potential of forests is subject of several of Moldova's national climate change policies and strategies, including the Environmental Strategy for 2014-2023 (Government of Molodva, 2014). The strategy establishes greenhouse gas (GHG) mitigation targets for seven sectors, including for the Land Use, Land Use Change and Forestry (LULUCF) sector. The target set for the LULUCF sector is to increase CO_2 net removals by 25% compared to the Business as Usual (BAU) level by 2020. Moldova needs to implement ambitious measures and actions to preserve and enhance forest ecosystems services and to meet the targets of its climate change policies and strategies for the forestry sector. This is a challenge because a large part of the national forest resources is already degraded and highly fragmented.

Forest resources are under pressure from a number of sources. Many rural households - about 60% of the 3.6 million Moldovans live in rural areas – depend on firewood for heating and cooking due to a lack of cheap, alternative energy sources. Experts forecast that increasing energy prices in Moldova will create an extremely difficult situation with regard to ensuring the protection and integrity of national forest resources (Galupa et al., 2011). Moreover, illegal logging for commercial purposes threatens valuable timber species such as oak and cherry. Forests are also affected by the livestock sector. Because of the low quality of pasture land in many communities, cattle is grazing in forests which has a negative impact on forest regeneration. Climate change will further increase the pressure on forests. Different simulations predict that Moldova's forests – in their current composition - will be seriously affected by a changing climate, which will likely lead to a decline in forest growth and productivity and to mass drying of forests in several regions of the country (FAO, 2010).

Deforestation and degradation of forests and protection forests belts contribute to land degradation in many regions of Moldova. Over the last decades, land affected by soil erosion increased by about 6,400 ha annually. Today, about 880,000 ha of land are eroded, which is equal to one-fourth of the country's total territory or 40% of the agricultural land (Figure 1) (Government of Moldova, 2014). Moreover, about 84,000 ha of non-agricultural land are affected by severe occurrence of landslides and ravines. Without intervention, the affected area is expected to increase by 1,000 ha annually. The annual economic loss caused by soil degradation is estimated to be around 3.1 billion MDL (MoEN, 2013).

Figure 1 Land affected by different levels of soil erosion
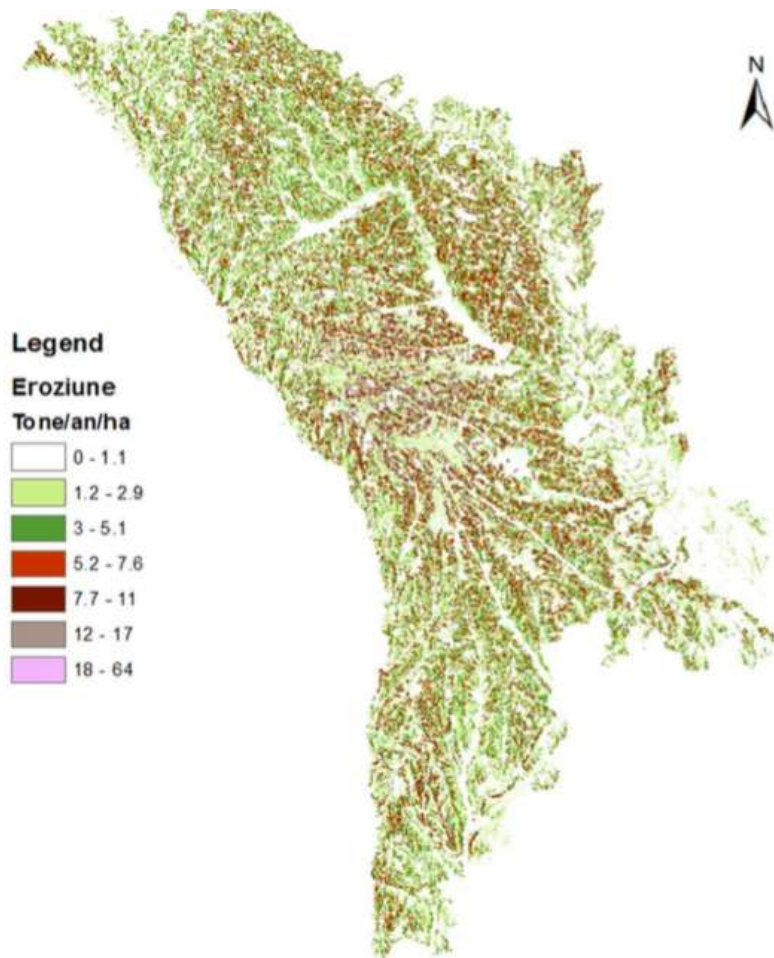
Source: UNFCCC (2008)

In addition to GHG mitigation targets, the Environmental Strategy for 2014- 2023 has set specific objectives to restore degraded land and to increase the national forest cover. It calls for "improving soil quality and ecological restoration of degraded, by landslides affected land, and increasing farmland buffer strips up to 100%." Moreover, it sets the target to increase the national forest cover to 15% by planting 150,000 ha of forest, including on degraded land, and by establishing 30,000 ha of riparian forest belts. The target for forest cover extension is included in several other national strategies, for example, the Strategy on Biological Diversity of the Republic of Moldova for 2015-2020.

The "NAMA on Restoring degraded land through afforestation in the Republic of Moldova" will be implemented to contribute to reaching the carbon sequestration target of the Environment Strategy for 2014-2023 as well as the land restoration and forest cover extension targets of this and other national strategies. The NAMA has the objective to reverse the trend of forest and

land degradation and to enhance carbon sequestration by 280,000 t CO2 annually by afforesting 45,000 ha of degraded, unproductive land and by establishing 15,000 ha of riparian forest belts and 1,500 ha of protection forest belts in agricultural systems. A comprehensive set of measures will be developed and implemented within the NAMA framework to ensure that afforestation activities are sustainable in the long-term. Measures include the establishment of a finance mechanism for afforestation and pasture renovation, the establishment of a capacity building programme for local communities to increase their participation in afforestation and forest management activities, as well as a market development programme for forest-based small and medium enterprises (SME). Moreover, the NAMA will provide a platform to coordinate afforestation activities and related initiatives and programmes in the forestry and agricultural sectors to avoid overlaps and duplication of efforts.

The NAMA builds on the experience of numerous programmes and projects that have been established in Moldova in the forestry and agricultural sectors to promote afforestation and reforestation, land restoration and carbon sequestration. Projects with a focus on carbon sequestration include, for example, the Moldova Soil Conservation Project, the countries' first CDM project and the second afforestation project worldwide to be approved by the CDM Executive Board. The project restored about 20,000 ha of degraded land through afforestation and will have sequestered about 3,6 million tCO_2e by 2022 (UNFCCC, 2008) (Figure 2).

Figure 2 Project site of the Moldova Soil Conservation Project before and after afforestation

Source: Spitoc, L.

The Moldova Community Forestry Development Project, Moldova's second CDM project, established new community forests on about 8,157 ha by means of afforestation of eroded and unproductive land, application of agro-forestry practices and the creation of forest protection

belts (UNFCCC, 2010). Another projects with relevance for the NAMA is carried out in the National Park Orhei where integrated pasture and community forest management systems are being established (UNDP, 2013). Moreover, the two-decade long experience in afforestation of the State Forest Agency Moldsilva will be decisive in the development and implementation of afforestation activities within the NAMA framework.

2. The Moldovan forestry sector

2.1 Developments and trends in the forestry sector

The Republic of Moldova is one of the countries in Europe with the lowest forest cover. At the beginning of the last century, the forest cover reached a minimum of 6% before the deforestation trend slowly reversed (Figure 3). Today, approximately 11% of the Moldovan territory are covered by forests which remain under high pressure from human activities as well from biotic and abiotic factors.

Figure 3 Forest cover development in the Republic of Moldova (in '000 ha)
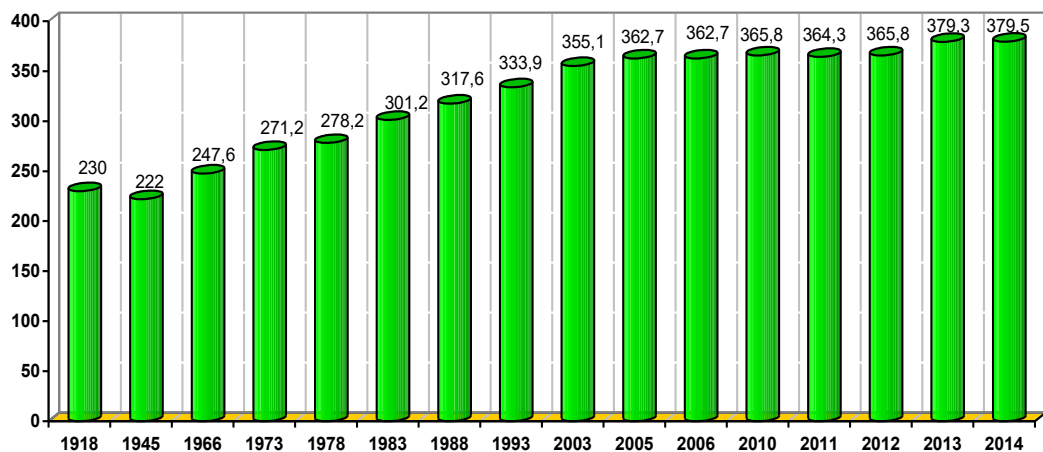
Source: Moldsilva

Many forests are located in hilly regions and are unevenly distributed throughout the country. The largest part of the Moldovan forest occurs in the central part of the country, with slightly less forests in the north and even fewer in the south (

Figure 4). Forests are mainly composed of broadleaved species, including oak, ash, hornbeam, black locust and popular.

Figure 4 Distribution of forests in the Republic of Moldova

NAMA on Afforestation of degraded land in the Republic of Moldova
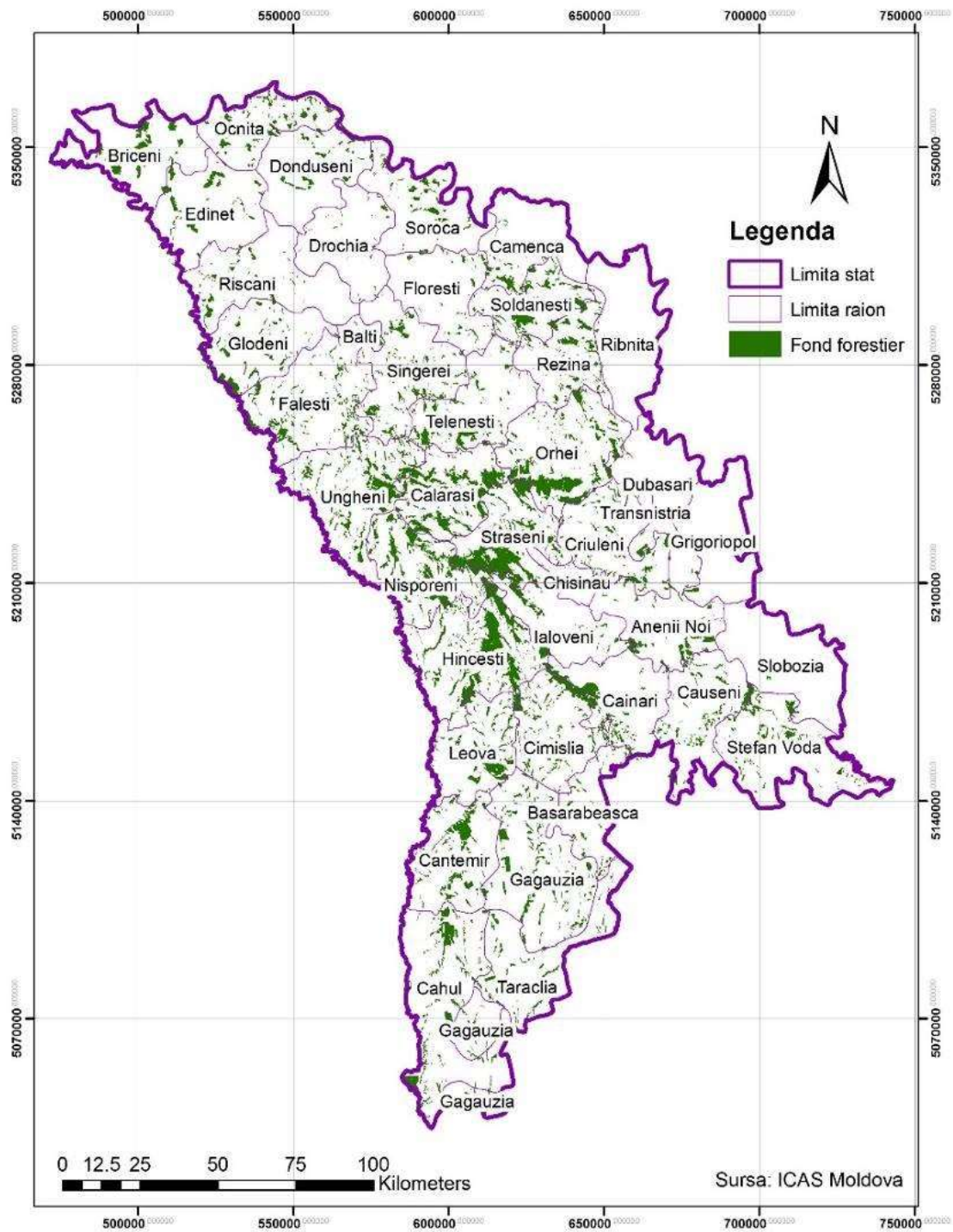
Source: ICAS

The Moldovan Forest Code (article 2) defines the "*fondul forestier national*" or national forest fund (land) as *"forests, land for afforestation, lands for forest management, unproductive lands included in the forest management plans or in the national cadastre as forests"*. The largest share of the forestland (87,2%) is under state property, while the rest (12,2%) belongs to Local Public Authorities (LPAs) and private owners (0,6%) (Table 1).

Table 1 Structure of forest land ownership in the Republic of Moldova

Category of owners	Total area in '000 ha (%)	Area covered with forests in '000 ha (%)
Forestland under state public property	362,0 (86,4)	326,4 (87,2)
Forestland under property of LPAs	54,5 (13,0)	45,7 (12,2)
Forestland under private property	2,6 (0,6)	2,4 (0,6)
Total	**419,1 (100)**	**374,5 (100)**

Source: Moldsilva

Approximately 50,000 ha of forest vegetation are not included under the national forest land definition. This includes 30,500 ha of protection forest belts in agricultural systems and riparian buffer stripes which have a long tradition in Moldova. A large part of these forest plantations is in different stages of degradation due to illegal cutting of firewood, improper management and competition from invasive species (World Bank, 2014).

Forests which are under the management of LPAs are categorized as forests for land and soil protection, as well as for protection against harmful industrial and climate factors. They are mostly small and scattered around rural and urban settlements and are often degraded due to illegal logging, grazing and waste pollution. Many LPAs do not have the skills and the financial resources to effectively manage and protect their forests and only 15% of them have forest management plans (Botnari, F. et al, 2011).

The forestry sector's contribution to the GDP is low and reached 0.27% in 2010. There are several reasons for this low contribution. A lack of timber supply is one of the largest problems of the forestry industry. Current capacities to process wood are largely underutilized. The structure of the forestry sector is also a barrier to market development. The majority of the

enterprises that engage in afforestation, forest management, timber harvesting and processing are state-owned and subordinated to the State Forest Agency Moldsilva. Their wood processing machinery if often obsolete and not all units operate efficiently. Moreover, the private sector is largely underdeveloped. This is in part due to a lack of opportunity to engage in forestry activities since the state owns a large share of national forest recourses and has developed the infrastructure to manage forests independently. Another reason for the underdeveloped private sector is a lack of incentives and resources – both human and financial – of local communities to develop forest-based small and medium enterprises (SME) (for more information on barriers to the development of the forestry sector, see chapter 2.3).

However, the low contribution of the forestry sector to the GDP does not reflect the importance of forest products and forest ecosystem services for the Moldovan population. There is a significant - partially unmet - demand for forest products on domestic markets. Many rural households depend on firewood for cooking and heating and on timber for construction of their homes. In particular firewood consumption occurs at unsustainable levels which is estimated to be 1,079 million m^3 per year, representing approximately 80% of the annual increment of forests vegetation (ENPI FLEG, 2011). A large percentage of firewood is harvested illegally. The value of the illegal harvest is conservatively estimated to be 15 – 17 million USD annually (World Bank, 2014).

2.2 Institutional framework and key stakeholders

Land restoration through afforestation is a cross-sectoral issue which is being promoted through laws, programmes and projects by different Moldovan institutions. The existing institutional framework does not have a clear separation of legislative and executive functions and does not reflect the decentralization of the decision-making process (Government of Moldova, 2015).

The Ministry of Environment, the State Ecological Inspectorate, Agency Moldsilva and its subordinate state entities, LPAs owning forests and other institutions owning minor forest vegetation, are the principal entities comprising the institutional framework of the forestry sector. The following sections give an overview on forestry sector institutions as well as on institutions that have a role in promoting land restoration, environmental protection and rural development.

Ministry of Environment. The Ministry of Environment (MoEN) is the state authority responsible for development and promotion of policies and strategies addressing environment protection, rational use of natural resources and biodiversity conservation.

Climate Change Office. The Climate Change Office (CCO) of the MoEN provides logistical support to the Government, central and local public administration authorities, non-government and academic organizations, in activities implemented and promoted by the Republic of Moldova under the UNFCCC and the Kyoto Protocol. Moreover, the CCO implements climate change related projects and activities, including the elaboration of national GHG inventories, development and implementation of GHG mitigation projects, and the implementation of activities that aim at raising awareness on climate change related topics.

State Environmental Inspectorate. The State Ecological Inspectorate has branches in each district that are subordinate to MoEN. It is responsible for the promotion and control of enforcement of environmental legislation. Moreover, it issues the authorization for forest management plan implementation and harvesting.

Agency Moldsilva. Moldsilva is the central public authority, subordinate to the Government, with the main responsibility to implement state policy in forestry and hunting. Moldsilva is responsible for issuing the regulatory framework for forestry, with a focus on technical rather than environmental issues. Moldsilva receives funding directly from the Government and is in this regard independent from MoEN. The agency also has administrative functions and has 25 subdivisions encompassing 16 State Enterprises for Silviculture, four State Enterprises for Silviculture and Hunting, four Natural Reserves, one National Park and the Forest Research and Management Institute (ICAS). There are 80 forest districts below the level of state enterprises. Forest research is undertaken within ICAS or in the scientific sections of the Natural Reserve administration within Moldsilva.

Local Public Authorities. Many LPAs are community forest owners with almost 100,000 ha of forests and forest belts. According to article 9 (and partially other articles) of the Forest Code, LPAs have certain obligations regarding forest management, which include organizing and coordinating usage, guarding, regeneration and protection of forest vegetation under their administration.

Ministry of Agriculture and Food Industry. The Ministry of Agriculture and Food Industry is the central government authority responsible for the development and implementation of policies and programmes on sustainable agricultural production as well as the promotion of the agri-food sector and rural areas.

Agency of Land Relations and Cadastre. The Agency of Land Relations and Cadastre monitors the implementation of state policy in the field of land use and territorial organization, including restoration and improvement of degraded land. It is leading works related to the preparation of the real estate cadastre, topography, cartography, geoinformatics and technical prospecting.

Ministry of Economy. The Ministry of Economy develops and, through subordinate institutions, implements policies and programs to support rural development with a focus on SME development, rural diversification, expansion of markets for local products, creation of public-private partnerships and establishment of industrial parks to facilitate private investment in rural areas.

Ministry of Finance. The Ministry of Finance, one of the central bodies of public administration, is responsible for the administration and allocation of public funds from national and international sources.

Academy of Sciences of Moldova. The Academy of Sciences of Moldova (ASM) is the highest scientific forum within the country and represents the only public institution of national interest in the sphere of science and innovation. The Academy has three institutes, the Botanical Garden (Institute), the Institute of Zoology and the Institute of Ecology and Geography.

Non governmental organizations. About 200 NGOs are active in the field of biodiversity conversation and the promotion of sustainable use of natural resources.

2.3 Barriers to afforestation of degraded land

2.3.1   Economic and financial barriers

In the Republic of Moldova, the implementation of environmental and natural resource programmes and projects is severely restricted by a lack of public finance[1]. The National Ecological Fund (NEF), the main financing tool for the implementation of environmental policy,

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[1] The barrier analysis is largely based on reports from The World Bank (2014) and Botnari F., Galupa D., Platon I. et al. (2011). The use of other sources is indicated in the text.

constitutes only 0.2% of the total national budget. Most of this funding covers staff costs and does not allow the MoEN to implement programmes and projects (CBD, 2014). This also affects the operations of Moldsilva. The central public authority for forestry and hunting receives little support from the state budget and is largely self-financing since 1998. State support decreased over the years due to the economic crisis that Moldova is facing (Table 2). State budget is provided for the development of forest management plans, forest protection, afforestation and reforestation, and scientific research, among other activities. The budget is distributed by Moldsilva among its subordinate entities based on their annual plans of activity. Article 46 of the Forest Code foresees the establishment of a Fund for the Conservation and Development of Forests by the government to finance forest management, regeneration and protection. However, the fund has not been created yet (Cerescu, A., 2015).

Table 2 Annual contribution of state budget support to total gross revenues of Moldsilva

	2009	2010	2011	2012	2013	2014
Support from the state budget ('000 MDL)	28,168	8,000	8,618	5,000	9,504	14,905
Total gross revenues of Moldsilva ('000 MDL)	184,757	185,521	223,807	254,160	296,577	302,808
Contribution of state budget support to total gross revenues (%)	15,2	4,3	3,9	2,0	3,2	4,9

Source: Moldsilva

Important income generating activities of Moldsilva include standing timber auctions for the private sector, the leasing of forests for hunting and recreation activities and the sale of timber products through the subordinate State Forest Enterprises. In recent years, additional income was derived from the sale of carbon credits generated by the Moldova Soil Conservation Project, the Moldova Community Forest Development Project and a third non-CDM afforestation project that sold voluntary carbon credits. However, Moldsilva's annual expenditures exceed annual revenues (Table 3) (see the section on barriers to market development for more information of the financial situation of Moldsilva.

Table 3 Overview on annual revenues and expenditures of Moldsilva (in '000 MDL)

	2009	2010	2011	2012	2013	2014
Gross revenue, forestry activities	127,557	152,824	187,894	224,445	258,974	262,803
Expenditures, forestry activities	163,014	162,634	210,376	236,602	278,682	293,988
Expenditures, salaries	81,132	88,708	116,702	126,361	175,253	167,265
Net income, forestry activities	**-116,589**	**-98,518**	**-139,184**	**-138,518**	**-194,961**	**-198,450**
Gross revenue, forestry industry	29,032	24,697	27,295	24,715	28,099	25,100
Expenditures, forestry industry	32,990	28,473	29,882	27,102	27,914	21,494
Expenditures, salaries	10878	10364	9,641	9,212	9,512	7,849
Net income, forestry industry	**-14,836**	**-14,140**	**-12,228**	**-11,599**	**-9,327**	**-4,240**
Total net income, forestry activities and industry	**-131,425**	**-112,658**	**-151,412**	**-150,117**	**-204,288**	**-202,690**

Source: Moldsilva

Moldsilva's investments in the forestry sector are constrained by a lack of access to financial services. Currently, the situation is intensified by a corruption scandal in the banking sector which affects banks' liquidity and investors' opportunities to obtain loans. Conventional loans are offered at an interest rate of about 19.5%, along with restrictive requirements for collateral, which does not match the needs of many projects in the forestry sector which often have high initial investment costs and long pay-back periods.

The lack of finance is an important barrier to the scale-up of afforestation activities in the country. This is reflected, for example, in the slow progress of reaching the targets on forest cover extension which are to be achieved through afforestation of degraded land, among other measures. Apart from institutional reforms that are required to increase the efficiency of some of Moldsilva's operations, and with that its annual stream of income, external support is needed

to finance a national-scale programme on afforestation, for example, from the state budget. The amount of degraded land that can be afforested with the currently available annual budget is not sufficient to stop the accelerating trend of land and forest degradation.

2.3.2 Socio-economic barriers

Moldova's remaining forest resources are highly threatened by overexploitation. One reason is the dependence of rural communities on forest resources, primarily of firewood for heating and cooking. Though a large share of the rural population has access to the gas grid, firewood is a cheaper source of energy for poor households. Moreover, logs are an important construction material for houses in rural areas (Popa, B. et al., 2014). As indicated in the chapter on developments in the Moldovan forestry sector, subsistence needs of rural communities are a large driver of illegal harvest of wood. The large unmet demand for forest resources could threaten the success of afforestation activities for land restoration if rural communities are not provided with alternative and affordable sources of energy. However, an afforestation programme could also offer part of the solution if land is set aside for the establishment of fast-growing energy plantations.

Activities of the agriculture and livestock sectors are also an important driver of forest and land degradation. Existing pastures are not sufficient to meet the growing demand of the livestock sector. Moreover, the productivity of pastures is low and approximately 70% are in different stages of degradation. Overgrazing causes soil degradation and further decline of pasture productivity. In search of alternative sources of fodder, cattle grazing in forests is increasing which damages young trees and has a negative impact on forest regrowth.

Restoration of degraded land through afforestation activities will unlikely be successful if the problem of pasture shortage and degradation is not treated in parallel. Planning at the landscape level will be necessary to effectively tackle the drivers of land and forest degradation.

2.3.3 Environmental barriers

The stability and functioning of many forest ecosystems in Moldova is disturbed. Defoliator pest outbreaks and a serious drought in 2007 affected the health of forests over the last years. There are several reasons for the instability of forest ecosystems, including the overexploitation of forest resources, improper forest and wildlife management and competition from invasive species. Moreover, Moldova's forests were almost completely cleared during the last century.

The majority of current stands grew from stump or root sprouts and from reforestation but the natural composition and formation of primary forests were often not taken into consideration. Hence, a large percentage of the mature forests stands lack the genetic and species composition of healthy forest ecosystems. The fragmentation of forest resources and their uneven distribution across Moldova is a negative factor for exercising eco-protective influences that would be beneficial for the environment, creating comfortable living conditions for the population and providing wood and non-wood products.

Agricultural systems are also affected by the depletion of forest resources. Forest protection belts in agricultural systems, which have a long tradition in Moldova, were largely cut down in the 90's by the population in search of firewood (Galupa, D. et al., 2011). With the degradation and disappearance of shelterbelts, important ecosystem services are being lost that these systems provide. This includes the protection of fields from wind and water erosion, regulation of microclimates by providing shade, improvement of water and nutrient infiltration, enhancement of biodiversity protection and provision of biological corridors in fragmented landscapes.

Different simulations predict that Moldova's forests – in their current composition - will be seriously affected by a changing climate, which will likely lead to the phenomenon of mass drying in several regions of the country. Researchers expect that even small changes in temperature and precipitation could greatly affect future forest growth and survival. Within the 2010-2039 period, the phytosanitary conditions will change significantly in the north of the country where it is expected that areas susceptible to die back (trees drying out) will expand by circa 15-25%. By 2040-2069, conditions will deteriorate further extending southwards. Building stable, diversified forests adapted to climate change presents a significant challenge and will require ongoing measures including research on species selection, adaptive provenances and genotypes (FAO, 2010).

Afforestation of degraded land and the reestablishment of forest protection belts for agricultural systems and riversides will strengthen the ecological stability of the landscape by reducing fragmentation and restoring ecosystem services provided by soil and forests. Species selection will be important to build healthy and resilient ecosystems that can also withstand current and future threats such as climate change.

2.3.4 Technical, capacity and information barriers

LPAs that own forests are responsible for their administration and protection. However, forest management activities are limited by a lack of human and financial capacity. Degraded and overexploited community forests reflect this constrain. Moreover, many communal lands that were afforested by Moldsilva during 2002-2010, have not yet been returned to the LPAs. Some LPAs do not have the capacities and knowledge that is required to manage their forests, while others do not want to take their forests back.

Enhancing local capacity and knowledge on afforestation and reforestation of degraded land, as well as on forest management and forest protection, will be necessary to ensure the effectiveness and sustainability of a national afforestation programme. This includes, for example, the preparation of forest management plans for community forests since most of LPA forests do not have them.

Moldsilva staff offers on-site training for local people during afforestation activities and through the National Forestry Consultative Office, but these efforts will have to be increased to ensure that enough capacities are available for the scale-up of afforestation activities on degraded communal land with community participation in all afforestation and forest management activities.

To effectively tackle the drivers of land and forest degradation in local communities, capacity building activities will have to be extended to other fields, including pasture management. As previously mentioned, a lack of feeding sources, especially of improved pasture, is an important driver of soil and forest degradation in rural communities. Better knowledge of farmers on improved pasture, pasture management and the benefits of silvopastoral systems – the association of pasture with trees and shrubs – will contribute to reducing the pressure of the livestock sector on local forests.

Forestry research conducted by ICAS, the Academy of Sciences of Moldova and universities is needed to support the scale-up of afforestation activities, provide recommendations on corrective actions and to evaluate their outcome. There are many examples of innovative forest research being undertaken. However, research relatively short term in nature partly due to limited budgets and funding. Moldova does not have a national forest research program and national coordination of forest research is lacking. The absence of a national forest research program, low involvement of the forestry public authority in establishing research priorities but also the fact that the results are not disseminated to the forestry state authority limits the effectiveness of the forestry research.

2.3.5   Legal, regulatory and institutional barriers

Article 2 of the law regarding afforestation of degraded land (Law no. 1041 from 15.06.2000) provides a definition for degraded land. Degraded land is land that has permanently lost its agricultural productive capacity through erosion, pollution or destructive anthropogenic activity, but can be improved through afforestation and other measures that restore its ecosystem services. Categories of degraded land are provided by the law, including for example, land with strong and excessive surface erosion, land affected by salinity, sandy soils affected by wind and water erosion and land polluted through chemicals and oil. In practice, the assessment of land and its classification according to the degraded land categories is sometimes difficult, because it does not provide well-defined indicators for land degradation. The definition of clear and measurable indicators to classify degraded land is needed to facilitate the identification of degraded land and the selection of suitable measures for its restoration. The indicators could be used for the establishment of a national soil information system (Mocanu, V, 2015).

In accordance with Article 15 of the same law, afforestation of degraded land is mandatory, both for private and legal entities, if local or national authorities for environmental protection find that afforestation becomes necessary to protect national interest and the well-being of the Moldovan population from the threats of land degradation. Land can be expropriated by the government if land owners do not comply with the law.

An important barrier to afforestation of degraded will be the willingness and ability of communities to dedicate part of their degraded land for afforestation since it is often used as pastureland for cattle. Cases are reported where farmers removed tree seedlings after reforestation activities to return the land to pasture (Gulca, V. 2006). This is done out of necessity rather than of ignorance because of the shortage of fodder and the important contribution of livestock products to the household income. Incentives will have to be offered to communities to increase their willingness to engage in afforestation and to protect their forests afterwards. For the long-term success of the NAMA, it is important to create a "forest culture" in local communities, so that afforestation is not regarded as a competition to livestock activities but as a complementary activity.

Another barrier to afforestation of degraded communal land and the effective management of LPAs' forests is the lack of a clear definition of the roles of LPAs and Moldsilva in theses activities. According to the Forest Code, LPAs have certain obligations regarding the management of their forests, such as organizing and coordinating usage, guarding, regeneration and protection of forest vegetation. Moreover, the regulatory framework states that LPAs and

Moldsilva have to cooperate towards the maintenance of community forest vegetation but a clear definition of the scope for such a cooperation is not provided.

Many LPAs do not have the knowledge, skills and financial resources that are required to effectively manage and protect their forests according to the technical regulatory framework. This is shown, for example, by the large annual amounts of illegally harvested wood in areas of easy access and where there is limited control and monitoring. In the absence of forest management plans and arrangements for their active management and protection, it is difficult to see how the LPA forests and newly established plantations under the afforestation programme can survive without becoming degraded and overexploited. Their future sustainable management will depend on a combination of improving the forest management institutional framework and forest management planning. Considering the significant anthropic pressure on these forests, their future management should be prioritized to halt their ongoing degradation.

The planning of afforestation activities will have to be based on a landscape approach since some of the important drivers of land and forest degradation lie outside the forestry sector. Planning at the landscape level will require cooperation and coordination of activities between the central authorities, such as Moldosilva, MoEN, the Ministry of Agriculture and Food Industry and LPAs. In the past, there was a lack of coordination and synchronization of policies and activities related to the use and conservation of natural resources. In general, cooperation between central and local government is insignificant in terms of environmental issues. Setting up the institutional framework for the NAMA programme will add an additional layer of complexity due to the scale of the programme and the lack of knowledge of some institutions of the NAMA mechanism.

2.3.6   Barriers to market development

The current contribution of the Moldovan forestry sector to the GDP is low, but there is a significant demand for forest products. However, the development of the forestry industry and the market for forest products is hampered by numerous factors.

The forestry industry is dominated by the State Forest Enterprises (SFE) which undertake most of the afforestation activities as well as the harvesting and the wood processing in the sector. Due to this dominance, the private sector is small and underdeveloped. The only area where some opportunities for private sector involvement are arising is harvesting under the timber auction system which started in 2010. However, the amount of timber offered at auctions is small and mainly includes species of low value.

While the SFEs produce good quality timber products which have a demand on domestic and international markets, they are constrained by a lack of competitiveness. Being state owned companies, they do not operate under the same profit seeking principles as private sector enterprises do. Their processing machinery, for example, is obsolete and inefficient. Moreover, timber and firewood prices are centrally set by Moldsilva and do not always reflect market prices. This affects the profit margin on timber and firewood sales of SFEs which have limited flexibility to deviate from the official price list. Forgone revenues from below-market timber prices exceed the revenues of the processing units (Mocanu, V, 2015). Another important factor that affects the operations of the SFEs is the lack of supply. Moldsilva has an annual wood processing capacity of approximately 100,000 m³ which is largely underutilized.

Promoting the development of small and medium enterprises (SME) in the private sector is an option to increase the competitiveness of the forestry sector while at the same time providing new sources of income, especially for rural communities. Afforestation activities, for example, are already frequently undertaken by members of local communities but they have more of an informal character since people are remunerated with firewood by forest rangers. The elimination of this practice will increase the opportunity for the establishment of SME that engage in afforestation. Moreover, extending the sale of all timber competitively on a fair and open market would additionally encourage the development of SMEs in harvesting, haulage and processing sectors.

2.4 Objective of the NAMA

The NAMA on Restoring degraded land through afforestation in the Republic of Moldova is a supported NAMA with unilateral elements. The NAMA will be implemented to contribute to reaching the targets of the national Environmental Strategy for 2014-2023 for carbon sequestration, land restoration and extension of national forest cover. The Environmental Strategy is a core element of the national pre-2020 mitigation policy framework. Moreover, the NAMA will contribute to reaching the national GHG mitigation target of reducing national emissions by at least 64% below 1990 levels by 2030. The target is stated in Moldova's Intended Nationally Determined Contribution (INDC).

The NAMA has the objective to reverse the trend of forest and land degradation and to enhance carbon sequestration by afforesting 45,000 ha of degraded land that lost its agricultural productive capacity and by establishing 15,000 ha of riparian forest belts and 1,500 ha of protection forest belts in agricultural systems. The NAMA will sequester 3.75 Mt CO2e during

its implementation phase of 15 years (2016-2030) and a total of 16.6 Mt CO_2e over a 60-year period.

A comprehensive set of measures will be developed and implemented with-in the NAMA framework to ensure that afforestation activities are sustainable in the long-term and to promote forest-based income opportunities for the rural population. Measures to be implemented are organized under three NAMA components, including i) an Afforestation Programme supported by research activities; ii) a Capacity Building Programme for Local Communities to increase their participation in afforestation and forest management activities; and iii) a Market Development Programme for forest-based small and medium enterprises (SME). A finance mechanism will be set-up as an overarching element to support the implementation of the three NAMA components. Moreover, the NAMA will provide a platform to coordinate afforestation and land restoration initiatives in the forestry and agricultural sectors to create synergies and avoid the duplication of efforts.

3. Policy analysis

3.1 National climate policy context of the NAMA

The Republic of Moldova contributes about 0.03% of the global GHG emissions. In 2013, the country's total GHG emissions were 12.8 Mt CO_2e and the per capita GHG emissions were less than half of the world average. About 65.5% of the national GHG emissions originated from the energy sector, followed by the agricultural sector (16.6%), waste sector (12.2%) and industrial processes sector (5.2%). The GHG emissions of the LULUCF sector contributed 0.2% of total emissions (MoEN, 2013).

With a few exceptions, the LULUCF sector was a carbon (C) sink during the period of 1990-2010 (Figure 5). After the Republic of Moldova declared its independence in 1991, CO_2 removals by forests decreased during the transition period due to some changes in the maintenance and use of forests, substantial increase of illegal logging, etc, but removals stabilized again after 1995. After 1995, cropland became a source of GHG emissions due to changes in the use and management of agricultural soils.

Figure 5 Emissions/removals in the LULUCF sector by source and sink categories between 1990-2010
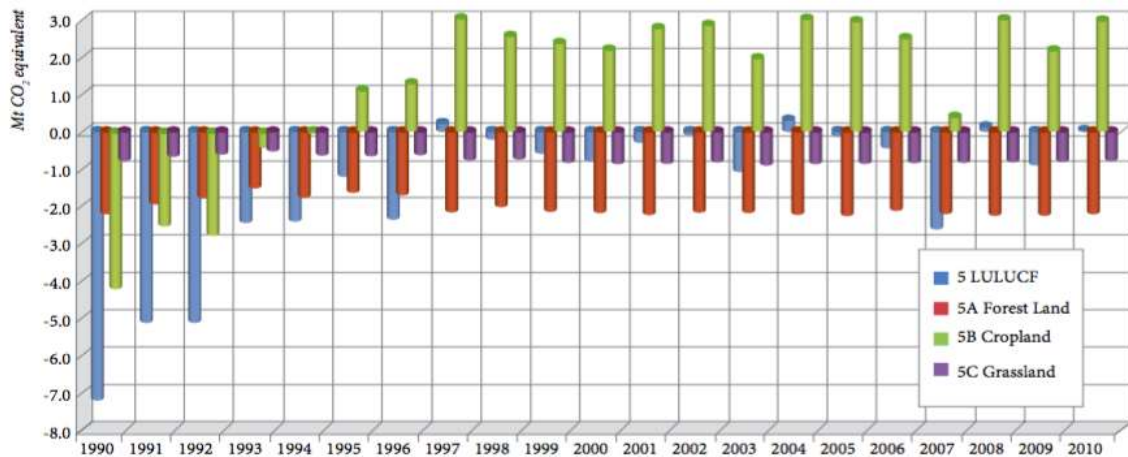
Source: MoeEN (2013)

Pre-2020 mitigation policy framework

In 2010, the Republic of Moldova joined the Copenhagen Accord and submitted an emission reduction target to the UNFCCC Secretariat, which states that "*a reduction of no less than 25% of the 1990 level total national GHG emissions has to be achieved by 2020 through implementation of global economic mechanisms focused on the climate change mitigation, in accordance with the Convention's principles and provisions*." The target was submitted without defining specific NAMA programmes or projects and needs for support. However, it was mentioned that significant financial, technological and capacity building support will be needed to reach the national GHG mitigation target.

The Environmental Strategy for 2014-2023 and the action plan for its implementation were approved in 2014. According to this policy document, a 20% GHG emissions reduction compared to the BAU scenario has to be reached by 2020. Along with the overall national target, the strategy defines GHG emissions reduction targets for seven economic sectors. For the LULUCF sector, net removals have to increase by 25% by 2020 compared to the BAU.   In addition to GHG mitigation targets, the Strategy sets specific targets for restoring degraded land and for increasing the national forest cover. It calls for "improving soil quality and ecological restoration of degraded, by landslides affected land, and increasing farmland buffer strips up to 100%." Moreover, it sets the target to increase the national forest cover to 15% by planting 150,000 ha of forest, including on degraded land, and by establishing 30,000 ha of riparian forest belts.

The NAMA will contribute to reaching the targets of the Environmental Strategy. By 2023, about 24,000 of 45,000 ha will be planted within the NAMA framework (assuming a constant annual afforestation rate), which is a contribution of 16% to the afforestation target of the Environmental Strategy. Moreover, the NAMA will plant 27% or 8000 ha of the riparian forest belts planned under the Strategy. Regarding carbon sequestration, CO_2 removals of forests are estimated to be 2.77 Mt CO_2 in 2020 under the BAU (MoEN). A deviation of the BAU by +25%, as stated in the Environmental Strategy, would result in net removals of 3.46 Mt CO_2. [Information of underlying BAU scenario is needed to determine contribution of NAMA to researching the target of thes Environmental Strategy].

The evaluation of the impact of the NAMA in terms of its contribution to reaching the targets of the Environmental Strategy is somewhat misleading because the timeframe of the NAMA is longer than that of the Environmental Strategy. However, the Environmental Strategy is currently the only strategy that defines a mitigation target for the LULUCF sector.

In 2011, a draft Low Emission Development Strategy (LEDS) was developed for 2020 that proposed NAMAs for several sectors as instruments to reach the national GHG emission reduction target. For the forestry sector, one of the proposed NAMAs is the afforestation of 81,000 ha of degraded land.

In September 2015, the Republic of Moldova submitted its Intended Nationally Determined Contribution (INDC) to the UNFCCC which states that the country *"intends to achieve an economy-wide unconditional target of reducing its greenhouse gas emissions by 64-67 per cent below its 1990 level in 2030 and to make best efforts to reduce its emissions by 67 per cent"* (Government of Moldova, 2015). Moreover, the emissions reduction target could be increased to 78 below 1990 levels, "*conditional to, a global agreement addressing important topics including low-cost financial resources, technology transfer, and technical cooperation, accessible to all at a scale commensurate to the challenge of global climate change"*.

Post-2020 mitigation policies framework

By mid-2016, the Government will prepare a new draft LEDS for 2030. After consultations at the national level, the LEDS will be subject to approval by the Government by end of 2016. As in the draft LEDS for 2020, NAMAs are expected to be an important element of the new LEDS.

3.2 Alignment of the NAMA with national and sector strategies and policies

The national forestry sector is regulated by about 20 laws, a number of government regulations, and a provision in the Constitution of the Republic of Moldova that states that "forests have a primary function to protect the environment, assuring its ecological equilibrium." The existing legal framework encourages the expansion of areas covered with forest vegetation through afforestation of degraded land and the restoration and extension of protection forest belts in agricultural systems and along riparian zones. However, the framework is characterized by some inconsistencies and overlaps between different regulations. This adds a layer of complexity and creates barriers to implementation or even understanding of the institutional framework (World Bank, 2014).

The main legal document of the forestry sector is the Forest Code (No. 887-XIII from 21.06.1996) which was amended several times since its adoption in 1996. However, the Forest Code does not reflect some important changes in the understanding of the role of forests which developed

over the last two decades, for example the role of forests in the contribution to climate change mitigation.

The main policy document approved by the parliament is the "Strategy for the sustainable development of the forestry sector" (No. 350-XV from 12.07.2001). A detailed action plan for the implementation of the strategy was first approved in 2003 (No. 739 from 17.06.2003) but then abrogated by the Government in 2012. While a replacement action plan is under preparation, a revised strategy and associated action plan are urgently needed (World Bank, 2014). The strategy explicitly calls for "integration of forest activities in the complex of national and regional strategies and programs". It recognizes the vital role of forests in environmental protection by reducing the negative effects of climate change, while improving air quality, stabilizing the hydrologic regime, and protecting soils and biodiversity. The strategy sets the target of extending the national forest cover to 15% through afforestation by 2020, which is equal to establishing about 130,000 ha of forest vegetation.

Several plans and programmes have been implemented in the Republic of Moldova to promote afforestation on degraded land and to contribute to reaching the goal of the Strategy. The "Program for valuation of land and increase in soil fertility for 2003–2010" (No. 636 from 26.05.2003) was established with the objective to improve soil quality, prevent erosion and restore degraded land. Afforestation was among the activities proposed to restore land affected by landslides and ravine formation. In total, 133,100 ha of degraded land were planned to be set aside for afforestation (72,650 ha) and the establishment of protection forest belts (12,140 ha of protection forest belts in agricultural systems; 28,330 ha of contour buffer strips; 14,940 ha of riparian buffer strips). The programme targeted in particular degraded land owned by LPAs. Due to a lack of funding, the targets were not fully met. About 57.9 thousand ha (80%) of degraded land were afforested and 75 ha (0.6%) of protection forest belts in agricultural systems and 168 ha (0.1%) of riparian buffer strips were established. A new "Program for valuation of land and increase in soil fertility for 2011-2020" was approved.

In 2014, the Government approved the "National Plan for extension of forest coverage for 2014-2018 (No. 101 from 10.02.2014). This programme has the objective to afforest 13,050 ha of land (10,400 ha degraded lands, 1,650 ha water protection belts and 1,000 ha forest belts for field protection).

4. NAMA baseline and targets

4.1 NAMA boundaries

The NAMA on Restoring degraded land through afforestation promotes afforestation activities on eligible land throughout the country, except for the eastern territories of Transnistria. The Republic of Moldova is divided into 32 districts, five municipalities and the autonomous regions Gagauzia and Transnistria (Figure 6). There are 1,681 localities of which 982 have their own LPAs, of which five have municipality status, 66 have city status, and 916 are villages with commune status. The remaining 699 villages are too small to have and independent administration and belong to either cities or communes. LPAs work on the basis of the autonomy principle and decentralization of local public services. Local autonomy is exercised through elected local councils and mayors.

Figure 6 Administrative territorial map of the Republic of Moldova

Source: MoeEN (2013)

The NAMA has the objective to afforest 45,000 ha of degraded land and to establish 15,000 ha of riparian forest belts and 1,500 ha of forest protection belts in agricultural systems. Land eligible for afforestation within the framework of the NAMA is land that is degraded according to the definition provided in Article 2 of the Law on Improvement of degraded land through afforestation (No. 1041-XIV from 15.10.2000) and that belongs to one of the degraded land categories established by the law. According to the law, degraded land is land that permanently lost its agricultural productive capacity through erosion, pollution or destructive anthropogenic activities, but that can be improved through afforestation or other ameliorative activities. The categories for degraded land include:

- Land with strong and excessive superficial erosion;

- Land with depth/linear erosion – surface erosion, ravine and gully erosion;

- Land affected by active landslides, crumbling, wash-out, etc;

- Sandy soils prone to wind and water erosion;

- Stony soils and lands with the deposition of heavy sediment;

- Land with permanent excess humidity; and

- Low or unproductive lands.

According to the regulatory framework, afforestation activities can be carried out by Moldsilva and LPAs. However, afforestation on communal land is often conducted by Moldsilva since many communities lack resources and knowledge to carry out the work by themselves. In this case, contracts are signed with Moldsilva permitting the agency to carry out afforestation work and to manage forest plantations for a certain period of time. After termination of contracts, afforested land is transferred back to local communities. Land ownership rests with the local councils for the entire contract duration. Hence, in terms of land ownership and management, the degraded land to be afforested within the NAMA framework can be categorized as (1) land of the Forest Fund managed by Moldsilva; (2) land owned and afforested by LPAs; and (3) land transferred from local councils to Moldsilva for the purpose of afforestation.

The Land Code and a Governmental Decision (No. 246 from 03.05.1996) establish the procedures for the selection of communal land for afforestation activities. A commission has to be set up with representatives from public agencies, environmental institutions, regional forestry institutions and local councils to identify degraded land for afforestation.   Once potential areas for afforestation are identified, each local council selects the land for afforestation.

The land that will be afforested under the framework of the NAMA has not been selected at this stage of NAMA development. However, a large percentage of the degraded land for afforestation is expected to be located on the territory of LPAs. Moreover, most of the areas covered with forest belts are publicly owned by LPAs. In the Moldsilva Soil Carbon Project, for example, 60% of the afforested land is publicly owned by LPAs while 40% belong to Moldsilva.

4.2 GHG impact of the NAMA

The estimates of the direct GHG mitigation potential of the NAMA are preliminary because the final project sites for afforestation are not know at this stage of the NAMA development process. Site conditions, species selection, rotation length and forest management will determine the net greenhouse gas removals by sinks. Preliminary calculations of the GHG mitigation potential are based on data reported by the Moldova Soil Conservation Project (UNFCCC, 2008). The CDM project carried out afforestation activities on degraded land throughout the country, therefore data is expected to be representative for afforestation sites under the NAMA which will use similar species and also operates at national scale. The carbon pools that were considered under the CDM project are above- and below-ground biomass as well as soil organic carbon.

Within the framework of the NAMA, 61,500 ha of degraded land will be afforested between 2016-2030 at an annual afforestation rate of 4,100 ha. A large percentage of the project sites targeted by the NAMA will be in moderate to severe stages of degradation which do not support significant vegetation. Without interventions to halt soil degradation, the soil C is declining on theses sites at a rate of 0.75 - 0.87 t C ha^{-1} annually. A mix of short and long-rotation species will be used for afforestation, the longest rotation being 100 years. The land afforested will be under vegetative cover on a permanent basis and soil carbon is expected to accumulate over time. Based on theses assumptions, the direct GHG mitigation potential of the NAMA is estimated to be as follows:

- 3.57 Mt CO_2e after 15 years (at the end of the NAMA in 2030)

- 7.47 Mt CO_2e after 20 years

- 11.86 Mt CO_2e after 40 years

- 16.6 Mt CO_2e after 60 years

Moreover, the NAMA is expected to have an important indirect GHG mitigation impact by

implementing activities that will promote the sustainable use of natural resources in local communities. The NAMA will implement a Capacity Building Programme with the objective to enhance the knowledge of local communities on topics such as forest management panning and pastures renovation.

4.3 Sustainable development baseline and co-benefit targets

The NAMA on Restoring degraded land through afforestation will have an important impact on sustainable sustainable development in the Republic of Moldova by delivering tangible environmental, social and economic benefits to the population. Moreover, the NAMA promotes ecosystem-based adaptation by addressing the links between climate change, restoration of land and forest resources and ecosystem services. The following sections give an overview on the contribution of the NAMA to the different dimensions of sustainable development.

Ecosystem-based adaptation

Ecosystem-based adaptation is not a co-benefit of mitigation actions carried out under the NAMA, but is the result of using forestry practices and technologies, in this case afforestation, that deliver both mitigation and adaptation benefits. Apart from carbon sequestration, afforestation of degraded land and the establishment of forest belts enhance soil productivity and protect soils from erratic weather events such as droughts and flooding, regulate hydrological cycles and micro-climates.

Healthy forests and soils are a necessity to reduce the vulnerability of the Moldovan population to negative impacts of climate change. In their current condition, however, national forests are not sufficiently adapted to the impacts of climate change and will therefore not be able to deliver the full scale of ecosystems services that are needed to build resilience against climate change. Enhancing the resilience and adaptive capacity of national forests is an important objective of the afforestation programme that will guide the selection of species to be planted on degraded land.

Environmental benefits

Within the NAMA framework, 45,000 ha of degraded land will be restored and existing riparian forest belts and protection forest belts in agricultural systems will be increased by 15,000 and

1,500 ha, respectively. These activities will help to reduce future land degradation by preventing landslides, improving the hydrological regime and minimizing water and wind erosion. Moreover, the increase of vegetation cover will build up soil organic matter which contributes to restoring soil productivity. Well-planned establishment of new forests supports the connectivity of fragmented landscapes and provides habitat for endangered flora and fauna.

Socio-economic benefits

An important objective of the NAMA is to enhance local capacities to afforest degraded land and to sustainably manage their forests. In parallel, the NAMA will provide incentives to increase the willingness of rural communities to engage in forestry activities. The incentive scheme will provide financial and capacity building support with the objective to:

- increase formal employment opportunities for local people in afforestation and forest management,

- increase the supply of forestry products and NTFP for rural people,

- promote development of forest- based SME in local communities.

The incentive programme will equally target women and men who traditionally share tasks for the collection and marketing of NTFP and afforestation activities.

Table 4 provides an overview on sustainable development goals and indicators of the NAMA on Restoration of degraded through afforestation. For many goals, quantitative targets will have to be set during Phase I of the NAMA, when the sites for afforestation are selected and the number of participating communities is known.

Table 4 Overview on sustainable development objectives and indicators of the NAMA

Category	Objective	Indicator	Target

| Adaptation	Enhancing resilience and adaptive capacity of forests	% of trees planted with a high adaptive capacity for climate change	to be determined during NAMA Phase I
Environmental benefits	Restoration degraded land and protection of land from future degradation	number of ha of degraded land afforested	Total: 45,000 ha Annual: 3000 ha
		number of ha of riparian forest belts established	Total: 15,000 ha Annual: 1,000 ha
		number of ha of protection forest belts established in agricultural systems	Total: 1,500 ha Annual: 100 ha
	Enhancing biodiversity protection	Floral species diversity in project sites relative to control sites	to be determined during NAMA Phase I
		Avian species diversity in project sites relative to control sites	to be determined during NAMA Phase I
		Floral community dominance index and native/exotic species ration in project and control sites	to be determined during NAMA Phase I
Socio-economic	Enhancing local capacities to afforest degraded land and to sustainably manage forests	number of of newly established forests and forest belts with forest management plans	100%
		number of people who received training in afforestation and forest management	to be determined during NAMA Phase I
	Increasing job opportunities for local people in afforestation and forest management	Number of jobs that were created in afforestation and forest management through activities promoted within the NAMA framework	to be determined during NAMA Phase I
	Promoting the development of forest-based SME in local communities	Number of forest-based SME created in local communities	to be determined during NAMA Phase I

Source: own elaboration

5. Measures & interventions under the NAMA

The development of the NAMA on Restoring degraded land through afforestation is based on a landscape approach to identify, develop and implement a comprehensive set of measures and activities that are needed to halt land degradation and to restore degraded, unproductive land through afforestation. The measures and activities are grouped together under the NAMA framework. They are selected based on the analyses of programmes and activities on afforestation and on barriers to the scale-up of a national afforestation programme. NAMA components are designed to build synergies with existing afforestation and land restoration initiatives and to provide missing elements for large-scale afforestation in Moldova. The following sections provide information on financial, institutional, technological and capacity building support that is needed to afforest 45,000 ha of degraded, unproductive land, 15,000 ha of riparian zones and 1,500 ha of protection forest belts in agricultural systems.

The NAMA framework has three components each of which consists of a set of measures to promote the large-scale implementation of afforestation on degraded, unproductive land. The components include: (1) an **afforestation programme** to plan, implement and monitor afforestation activities on 65,000 ha of land; (2) a **capacity building programme** to strengthen the skills and knowledge of local communities on afforestation and sustainable resource management; and (3) a **market development programme** to promote the development of forest-based SME. A NAMA finance mechanism will be established to secure long-term finance for activities to be developed under the three NAMA components as well as to create incentives for local communities to engage in afforestation and sustainable management of natural resources (Figure 7).

Figure 7 Components of the NAMA on Restoring degraded land through afforestation
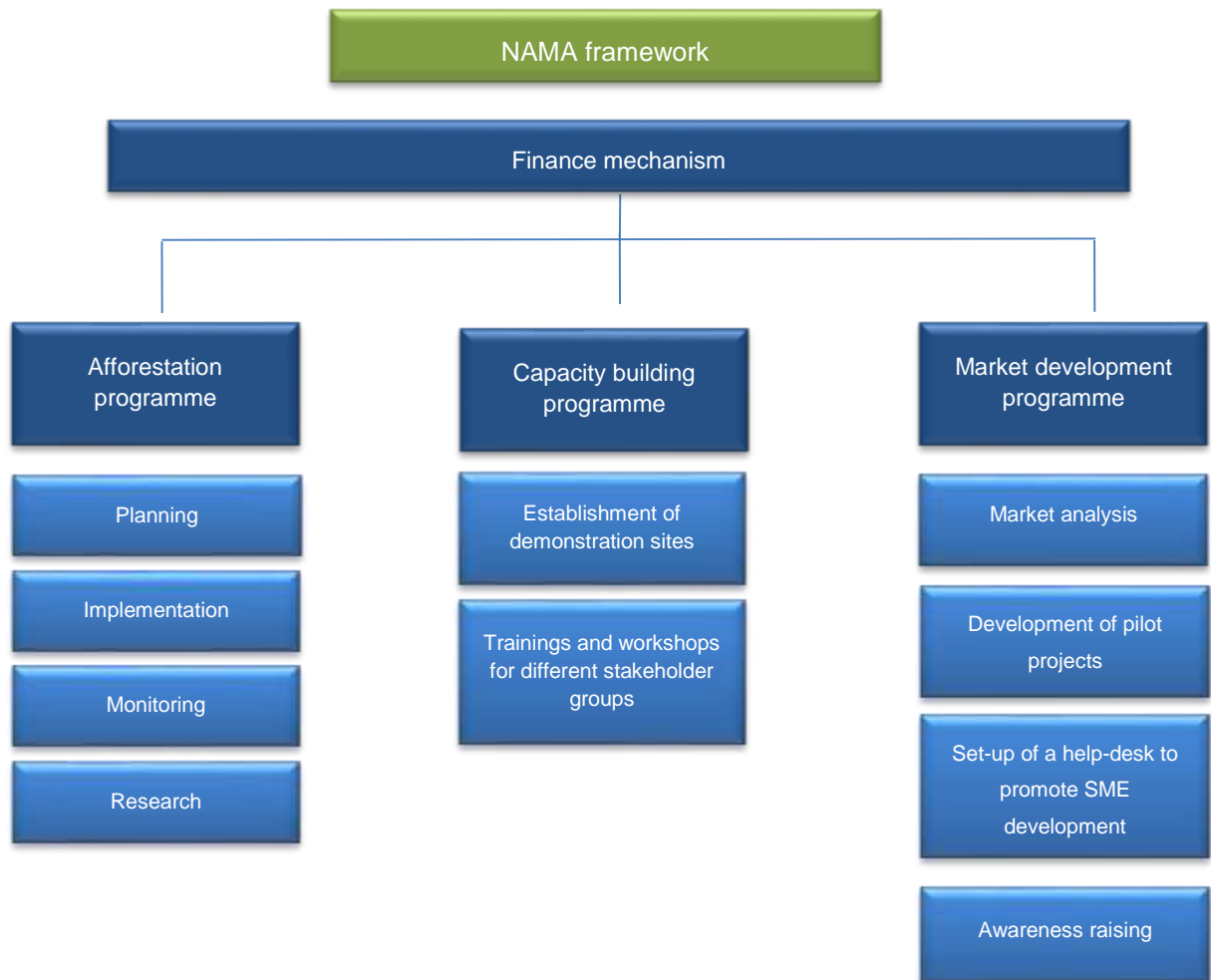
Source: own elaboration

The NAMA will be implemented in a phased approach consisting of three phases:

- Focus of the "Readiness Phase" (2016-2018) is to develop and implement activities

planned under the three NAMA components on a pilot scale. The main goal for the Afforestation Programme is to select degraded land for afforestation and to prepare and initiate afforestation activities. Under the Capacity Building Programme, demonstration sites for afforestation and sustainable resource management will be established and training programmes will be initiated in selected communities. A grant fund will be set up to support local communities in their efforts related to forest management and pasture renovation. The Market Development Programme will start with market research on forestry products and NTFP. Pilot projects for SME will be selected and business plans will be developed. The scheme for a revolving loan fund to promote investments in forest-based SME will be designed and a testing phase of the loan scheme will be launched.

- Focus of the "Start-up Phase" (2019-2023) is the transition from pilot level SME to enterprises that operate under market conditions. The revolving loan fund will be launched and a help-desk will be established to support newly established SME and to promote further SME development. Activities carried out under the Afforestation and Capacity Building Programme continue as in Phase I. Evaluation of results achieved under Phase I will be used to adjust or extend the scope of trainings offered to local communities based on their feed-back, interest and request for support.

- Focus of the "Scale-up Phase" (2024-2030) is to promote forest-based SME development on a large scale based on experience gained from pilot SME development and the testing phase of the revolving loan fund. Afforestation on degraded land will continued and activities under the Capacity Building Programme will be slowly reduced.

5.1 Afforestation programme

Afforestation of degraded land and the establishment of riparian forest buffers and protection forest belts in agricultural systems are the principal activities under the NAMA. The afforestation programme is the component of the NAMA with the largest direct GHG impact. It comprises all activities and measures that are needed to establish and manage 65,000 ha of afforested land. Afforestation activities will be supported through research on relevant topics, for example, the adaptive capacity of tree species and forest ecosystems on climate change, the impact of afforestation activities on land restoration and biodiversity protection. The following sections give

an overview of activities that will be implemented during the planning, implementation and monitoring stages of the afforestation programme.

5.1.1   Planning stage

Selection of land. During the planning stage, the land for afforestation is selected by Moldsilva and local councils. In case of communal land, commissions are established to identify degraded land and to select land for afforestation. Members of the commissions are, for example, representatives of local public bodies, technical experts, environmental authorities and representatives of regional forest enterprises. If communities decide to transfer land for afforestation to Moldsilva, contractual arrangements are made between both parties.

Degraded land is selected based on information provided by the Land Cadastre. For the selection of land that is not classified as "degraded" under the Cadastre, e.g. pastureland, information from other sources, such as the Institute of Pedology, Agrochemistry and Soil Protection "N. Dimo", is used. Moreover, visual appraisals are conducted in the field applying indicators such as topographic position, presence of gullies and landslides, presence and condition of existing vegetation, etc. This methodology was used in two Moldovan CDM afforestation projects to determine the "degraded land" status of selected plots. Moreover, project sites are selected with the goal to create synergies with past and ongoing programmes and projects for forest extension, land and pasture restoration such as the "National Plan for extension of forest coverage for 2014-2018" and the The "Program for valuation of land and increase in soil fertility for 2003–2010".

Selection of species. The species for planting are selected based on several criteria, including site conditions, rotation length and delivery of socio-economic and environmental benefits. The future impact of climate change on tree growth is another important criterion for the selection of tree species. The programme will closely cooperate with institutions that carry out research on this topic, for example, ICAS.

In case of afforestation on communal land, communities will actively participate in species selection. Technical experts will support the selection process to ensure a healthy balance between species for restoration and conservation purposes and trees that meet short-term needs of communities, for example, for firewood, logs and NTFP. Where possible, preference is given to native species, with focus on those growing in the area. However, past experience has demonstrated that many native species require better soil conditions than locally adapted

species. Hence, establishment of adapted species can help to improve soils for native species that will then be established during a subsequent rotation period.

Preparation of forest management plans. Forest management plans will be developed for all areas to be afforested under the NAMA programme. In case of afforestation of communal land, forest management plans will be developed in close cooperation with local communities and have to be approved by LPAs. An integrated planning approach will be adopted to consider issues such as grazing, illegal logging and the needs of rural communities for forestry products and NTFP. The programme will draw from the experiences in integrated forest management planning from Moldsilva and ICAS, the National Centre for Forestry Consultancy (NCFC), ENPI FLEG, the project on Sustainable management of pastures and community forests in the National Park Orhei, among other institutions and projects.

5.1.2 Implementation stage

Afforestation of degraded land. Afforestation activities include site preparation, nursery management, planting stock development, planting, protection and management of plantations. The activities involve manual and mechanical methods of soil preparation and planting. The post-planting activities include protection, gap planting, tending, pest management, thinning, fire control and harvesting. Activities will be inline with the national guidelines of scientific forest management and silvicultural practices implemented by Moldosilva Agency.

Forest management. The local councils are expected to delegate responsible staff to manage sites as per approved forest and pasture management plans developed under the project.

5.1.3 Monitoring activities

The NAMA Afforestation Programme will monitor the development of newly established forests as well as soil carbon changes. A GHG monitoring system will be established based on the experience of the Moldova Soil Conservation Project in carbon monitoring and assessment of afforested degraded lands. Above-ground tree vegetation will be monitored over time by measuring the growth of individual trees in permanent sample plots at fixed intervals, keeping track of growth, ingrowth and mortality and associated changes in carbon of individual trees. Soil carbon will be measured using temporary plots by taking soil samples to depth of 30 cm. The soil sampling will cover both rich and poor strata and sample size calculated ensures the quality assurance and cost effective measurement of changes in the soil carbon.

Moreover, a monitoring system will be developed to track relevant climate-related data on how forest species will be affected by climate change i.e., what physical and biological changes could take place as a result of changes in temperature and precipitation. The monitoring system will build on existing systems that have been set-up for a similar purpose, for example, the monitoring system of the project on Sustainable management of pastures and community forests in the National Park Orhei.

5.2 Capacity building programme

5.2.1   Trainings and workshops

Awareness raising and capacity building have shown to be some of the most effective measures to promote sustainable resource management in local communities of Moldova. The NAMA Capacity Building Programme will offer a serious of trainings and workshops to local communities on topics including afforestation and land restoration, sustainable forest and pasture management. Where relevant, trainings will have a theoretical and a practical element. Trainings will target different stakeholder groups at the local level such as farmers, farmer associations, forest managers and representatives of LPAs. Training will also be provided to staff of Moldsilva with a special focus on climate change related topics, for example, implementation of measures to improve the adaptive capacity of forests.

5.2.2   Demonstration sites

Demonstration sites will be established to demonstrate afforestation and sustainable forest and pasture management practices during trainings and workshops and to promote their large-scale implementation. Demonstration sites will include areas that were afforested in previous projects and were good results were achieved, for example in the Moldova Soil Conservation project. Forests in these areas are mature enough to show the impact of afforestation on land restoration.

5.3 Market development programme for forest products and NTFP

Within the NAMA framework, the development of forest-based SME will be promoted as an incentive for afforestation and sustainable forest management. Forest products and NTFP are an important part of the livelihoods of rural households in Moldova. However, despite their

importance and value, the size of the formal market for forest products and NTFP is small. NTFP are mainly used for subsistence and not marketed commercially, and a large percentage of firewood and wood is sold in informal markets or traded illegally. While informal or illegal trade of forest products might be beneficial for involved parties in the short term, they have a detrimental impact on forest ecosystems and undermine their ability to provide goods and services to the Moldovans in the medium and long term. Controlling illegal trade and promoting market development for forest products and NTFP will help to protect forest resources and to create opportunities for economic development in rural areas. Needs of poor rural communities for both forest products and job opportunities will be given particular consideration in market development planning.

Market analysis on the potential of SME. At the beginning of the market development programme, market analysis will be carried out to identify the potential for forest-based SME development. Local, regional and national market opportunities will be assessed as well as the barriers to SME development. The assessment will be linked to forest management planning which will provide information on growth potential of forest products and NTFP by type, species and location as well as on harvesting thresholds. A short-list of products and potential pilot projects is the expected result of the initial market analysis. Moreover, market analysis will be conducted throughout the entire lifespan of the NAMA to support the different phases of market development for forest-based products and NTFP.

Development of pilot projects. Based on the market analysis and the short-list of products and projects, pilot projects for SME development will be selected. Owners will be supported in the preparation of enterprise development plans and will receive training and assistance to start enterprise activities at the pilot level. The development of the pilot SME will be monitored and results of the evaluation will provide guidance on how to scale-up SME development in the forest sector.

Creation of a help-desk to support forest-based SME development. A help desk will be established to support interested stakeholders with all issues relevant for the development, implementation and operation of forest-based SME. This includes support for the preparation of business plans, preparation of applications for the revolving loan fund and marketing of products.

6. NAMA financial mechanism and requirements

6.1 NAMA finance mechanism

The Government of Moldova lacks funding to fully implement national programmes on afforestation and to meet the afforestation targets proposed in several national strategies. Funding from the national budget allocated to Moldsilva decreased substantially over the last years and with Moldsilva's own resources only part of the targeted area can be afforested annually. This situation will likely not change in the near future. Proposed reforms to increase national budget allocations to the NEF and to improve the efficiency of some of Moldsilva's operations will take time. Moreover, Moldsilva and LPAs will not be able to remove investment barriers to afforestation projects through inexpensive loans from national banks. Some carbon payments from the CDM projects are still outstanding, but these payments are due in a couple of years and will not solve the current cash flow problem of forestry sector institutions.

The NAMA on Restoring degraded land through afforestation in the Republic of Moldova is presented as a supported NAMA with unilateral elements. A NAMA finance mechanism will be set up to collect funds from national and international sources that will be made available through different financial instruments to implement the NAMA components. International financial support is requested in form of a concessional loan and grants. In the following sections, an overview is given on the distribution of funds between the NAMA measures and activities (Figure 8).

A concessional loan with a low interest rate ($\leq$ 5%) would help to cover the upfront investment costs of afforestation activities during the first years of the implementation of the Afforestation Programme. With market interest rates between 15-20%, afforestation projects on degraded land are financially not viable due to the low productivity of the degraded sites. A financial analysis carried out under the Moldova Soil Conservation Project project showed that afforestation projects on degraded land have negative net present values (NPV) and negative or low internal rates of return (IRR) even under scenarios with carbon payments and interest rates of 10%. A financial analysis carried out for the development of the NAMA proposal (based on data from the Moldova Soil Conservation Project) indicates that afforestation projects on degraded land would have a positive NPV at an interest rate of 5%.

Figure 8 Structure of the NAMA finance mechanism
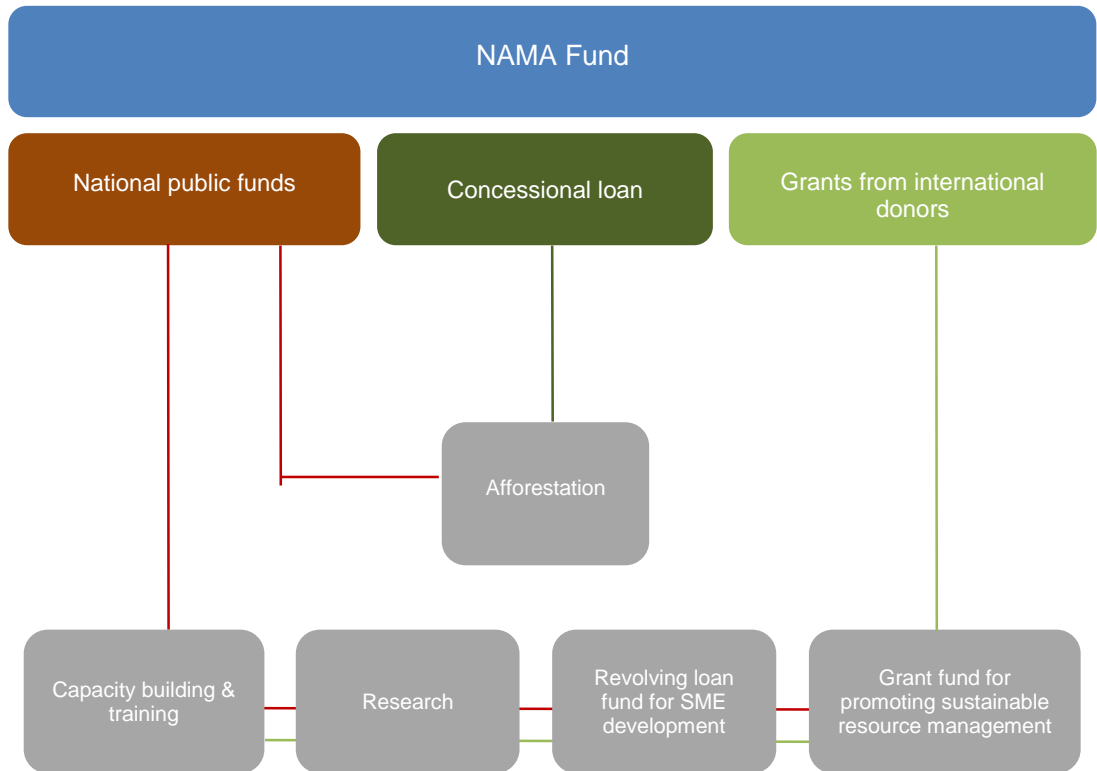
Source: own elaboration

Capacity building and research activities would be carried out with financial support in form of grants. Moreover, grants would be used to establish a revolving loan fund for SME development as well as a grant fund to promote sustainable resource management in local communities. A grant could also be issued in form of result-based payments for carbon sequestration through afforestation. Result-based payments would provide cash-flow needed to continue afforestation activities under the Afforestation Programme or to extend activities to degraded land not targeted under the NAMA.

6.2 Indicative NAMA financing needs

The preliminary cost estimate for implementing the NAMA is USD 150 million. This covers the full cost of implementation of the Afforestation Programme as well as the costs for the Capacity Building and Market Development Programme for NAMA Phase I and II. The costs of these two components during Phase III will be determined at a later stage. Cost estimates are preliminary at this stage of NAMA development because afforestation sites will be selected during Phase I and with that, the exact number of communities targeted by the Capacity Building and Market Development Programme will be known.

The estimated incremental cost of implementing the NAMA is USD 109,5 million. Without external financial support, Moldsilva, the central public authority for the forestry sector, and local communities afforested about 1,200 ha of degraded land annually over the last years. If no external support were provided between 2016-2030, 18,000 ha of degraded land could be afforested for a total cost of approximately USD 40,500,000. The annual technical capacity of afforestation of degraded land would allow to afforest an additional 43,500 ha between 2016-2030, equal to an additional 2,900 ha per year. This activity has a total cost of USD 97,875,000. Moreover, without external financial support, the activities proposed under the Capacity Building and Market Development Programme would not be implemented due to a lack of national funding. The cost of activities to be developed under both NAMA components is about USD 11,625,000 for NAMA Phase I and II. Of this amount, USD 5,000,000 would be used to establish a revolving loan fund in Phase II to support the development of forest-based SME. An additional USD 3,000,000 would be used to set up a grant fund to support the sustainable use of natural resources in local communities, e.g. the preparation of forest management plans and the renovation of degraded pasture. The rest of the amount would be used for the following activities: USD 1,625,000 for monitoring and supporting research (Phase I and II), USD 2,000,000 for capacity building support for local communities on afforestation and SME development (Phase I and II).

Table 5 Break down of costs of NAMA measures and activities

NAMA component	Activity	Description	Total cost	Phase I	Phase II	Phase III	Source
Afforestation	Afforestation of degraded land and establishment of forest protection belts	The target is to afforest 45,000 ha of degraded land and to establish 15,000 ha of riparian forest belts and 1,500 ha of protection forest belts in agricultural systems. The area to be planted will be evenly distributed across the year, resulting in an annual afforestation target of 4,100 ha.	138,375,000	27,675,000	46,125,000	64,575,000	Concessional loan; national public funds
Afforestation	Supporting research and monitoring	Focus of supporting research is to improve the adaptive capacity of national forests for climate change. The performance of newly established forests in terms of carbon sequestration, biodiversity protection and adaptation to climate change will be monitored.	1,625,000	500,000	1,125,000	to be determined in Phase I or II	Concessional loan; national public funds
Capacity building and training	Training of local communities on sustainable	Local communities will receive training based on demand on different topics such as	750,000	250,000	500,000	to be determined in Phase I or II	International grant, national public funds

|							
	resource management	afforestation, forest management planning and pasture renovation. Previous projects showed that these activities provide an additional incentive for communities to engage in afforestation activities.					
Capacity building and training	Establishment of a grant fund for investments in sustainable resource management	In addition to trainings and workshops, a grant fund will be established to support investments in activities that promote natural resource management in local communities.	3,000,000	1,000,000	2,000,000	to be determined in Phase II	International grant, national public funds
Market development	Establishment of a revolving loan fund	A revolving loan fund will be established to provide capital for investments in SME	5,000,000	-	5,000,000	to be determined in Phase II	International grant, national public funds
Market development	Market research, help desk	SME development will be support through market research and the establishment of a help desk	1,250,000	500,000	7500,000	to be determined in Phase II	International grant, national public funds

Source: own elaboration

7. Institutional set-up for NAMA implementation and operation

The institutional framework for the implementation of the NAMA on Restoring degraded land in the Republic of Moldova will have to reflect the complexity of the NAMA programme which is cross-sectoral and includes a broad range of topics such as afforestation, mitigation of climate change, land restoration, biodiversity conservation, rural development and financing. For the implementation and operation of the NAMA, a multidimensional institutional framework is proposed consisting of i.) a ministerial steering committee, ii.) a technical coordination and implementation unit, iii.) a research and technical guidance unit, iv.) a finance unit and v.) a monitoring and supervision committee (Figure 9).

Figure 9 Proposed structure of the operational framework of the NAMA
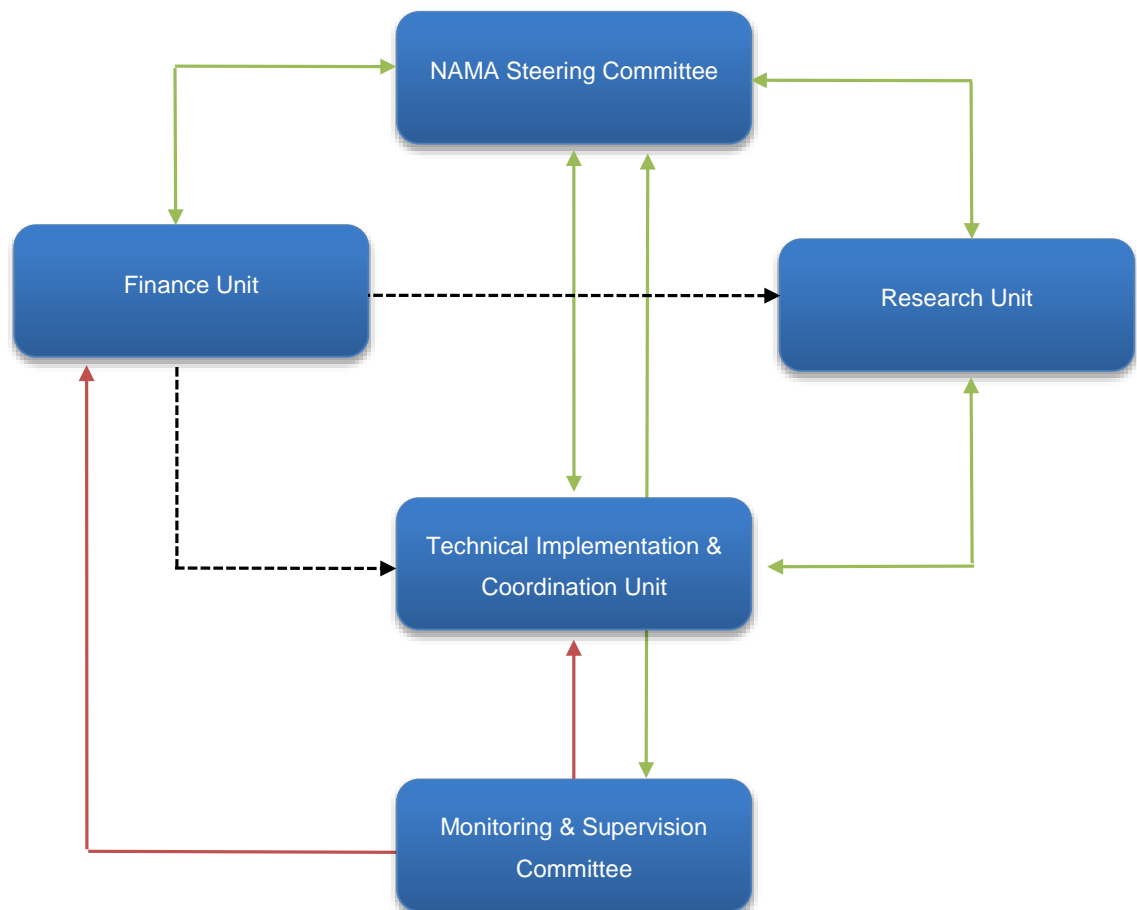
Source: own elaboration

NAMA Steering Committee. The NAMA Steering Committee oversees and guides the NAMA implementation process, sets the objectives and prepares the implementation plans for the three

phases of the NAMA, selects implementing partners for the different NAMA components and is responsible for obtaining finance from national and international sources for NAMA implementation.

The NAMA Steering Committee should consist of representatives of all ministries that will have a role during the implementation of the NAMA. This includes the Ministry of Environment, the Ministry of Agriculture and Food Industry, the Ministry of Economy and the Ministry of Finance as well as relevant subordinated institutions such as Moldsilva. Since the Climate Change Office has the mandate to promote and implement climate change related programmes and projects, it could lead the NAMA Steering Committee. The lead of the NAMA Steering Committee could also be shared between two parties who take over different areas of responsibility. The Climate Change Office could be responsible for environmental and climate change related activities and for communicating and reporting NAMA relevant activities at the international level, for example, to the UNFCCC and international donors. Moldsilva could take the lead for all activities related to afforestation and forest sector development, including communication to stakeholders at the national, regional and local level.

Technical Implementation and Coordination Unit. The Technical Implementation and Coordination Unit is the executive body of the NAMA. It will be responsible for implementing the three components of the NAMA: the Afforestation Programme, the Capacity Building Programme and the Market Development Programme. The Unit develops the content of the three NAMA components based on the guidelines provided by the NAMA Steering Committee and prepares detailed plans of activities for each component and NAMA phase.

Moldsilva and some of its subordinated entities would have a leading role in the development and implementation of the Afforestation Programme, the Capacity Building Programme and the Market Development Programme.

Research Unit. The research unit will have an advisory role for the NAMA Steering Committee and the Technical Implementation and Coordination Unit throughout the entire NAMA implementation process. It will provide scientific guidance based on existing research and it will support NAMA implementation and evaluation through research on a number of relevant topics.

ICAS, Moldova Academy of Sciences and national universities and research programmes would be part of the Research Unit.

Finance Unit. The Finance Unit will oversee all financial transactions carried out under the NAMA Finance Mechanism and will approve annual budgets and allocate funds to each NAMA

component according to annual budget plans. The Finance Unit could be composed of the Ministry of Finance and international donors that provide funding for the implementation of the NAMA.

Monitoring and Supervision Committee. The Monitoring and Supervision Committee will be responsible for the MRV of NAMA activities and for ensuring that the objectives of the NAMA are met. The committee will consist of the entities that are part of the institutional framework for MRV (see chapter 7). These entities are lead by the MoEN and include a National Committee for MRV, a Technical Committee and a NAMA MRV Group.

8. Measuring, Reporting & Verification

The Republic of Moldova has developed a draft institutional framework for a NAMA MRV system (Pedersen, M. 20015) (Figure 10). The country has already a well-functioning MRV system for CDM projects which served as guidance for the set-up of the NAMA MRV scheme. The proposed institutional framework consists of MoEN, a National Commission, a Technical Committee and a MRV-NAMA Group.

In the proposed scheme, MoEN will have the overall responsibility for the MRV of NAMAs and an existing National Commission will be delegated the responsibility to prioritize, evaluate, approve NAMAs and carry out MRV of NAMAs. The National Commission was established in 2003 (GD No. 1574 from 26.12.2003) with the mandate to communicate with the UNFCCC on CDM related matters, to evaluate CDM projects and to issue national Letters of Approval for CDM projects. At present, the National Commission does not yet have the mandate to engage in respective NAMA activities.

Figure 10 Proposed institutional set-up for a NAMA MRV scheme
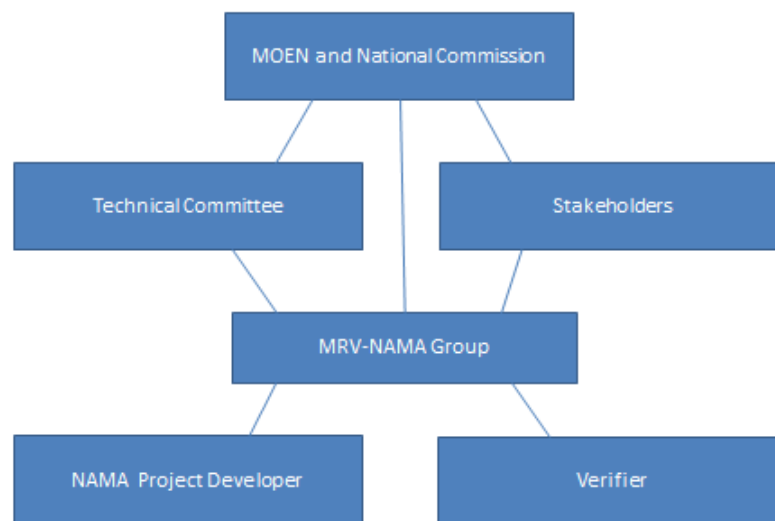
Source: Pedersen, M. (2015)

A Technical Committee will be established to support the National Commission and its main task will be to evaluate NAMAs during all phases of NAMA development and implementation. The Technical Committee should have permanent experts which cover key aspects of a NAMAs related to i) legal and administrative aspects, ii) policy and strategy, iii) financing, iv) technical aspects and v) MRV.

Moreover, it is proposed to establish a MRV NAMA Group which would have the specific function to carry out all activities related to the MRV of NAMAs. The Group is proposed to consist of 10-15 experts.

References

Harvard style of referencing should be used along with the Word Citation function (under "References" and "Citations & Bibliography").

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http://libweb.anglia.ac.uk/referencing/harvard.htm