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NATIONALLY APPROPRIATE MITIGATION ACTION ON

AFFORESTATION OF DEGRADED LAND, RIVERSIDE AREAS AND PROTECTION BELTS IN THE REPUBLIC OF MOLDOVA

United Nations Development Programme

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Kimberly Koserowski

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UNDP LOW EMISSION CAPACITY BUILDING (LECB) PROGRAMME

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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
PDD	Project design document
SDG	Sustainable Development Goal
SFE	State Forest Enterprise
SME	Small and medium enterprises
tCER	temporary Certified Emission Reduction
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change

EXECUTIVE SUMMARY

In the Republic of Moldova, only about 11% of the country's territory are covered by forests, which makes it one of the European countries with the lowest forest cover. Remaining forests are under high pressure due to illegal logging for commercial purposes and the dependence of rural communities on firewood for heating and cooking. Rural reliance on firewood is prevalent because with an average monthly income of € 80€, many households cannot afford the regular use of electricity or gas. Moreover, many households rely on illegally harvested firewood which is cheaper than firewood from legal sources.

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 nationwide are eroded, which is equivalent to one-fourth of the country's total territory or 40% of the agricultural land.

The NAMA on Afforestation of Degraded Land, Riverside Areas and Protection Belts in the Republic of Moldova has the objective to reverse the trend of forest and land degradation and to enhance carbon sequestration by 261,600 tCO_2 annually until 2030 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. In total, 61,500 ha will be afforested at an annual afforestation rate of 4,393 ha. Moreover, the NAMA seeks to strengthen capacities of local communities to afforest degraded land, to sustainably manage their forests and pastures and to engage in the development of forest-based small and medium enterprises (SME). These activities aim at creating a "forest culture" in local communities, so that afforestation is not regarded as a competition to agricultural activities but as a complementary activity. Planning of afforestation and natural resource management activities will take place at the landscape level to effectively tackle the drivers of land and forest degradation.

The NAMA implementation process will end in 2030 but forest plantations will continue to sequester carbon. By 2030, about 2.13 Mt CO_2 will be sequestered which will increase to 5.15 Mt CO_2 by 2045. In addition to carbons sequestration, the NAMA will have an important impact on sustainable development in the Republic of Moldova by delivering tangible environmental, social and economic benefits to the population. Adaptation co-benefits will be delivered because 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. Socio-economic benefits include an increase of formal employment opportunities for local people in afforestation, forest management and forest enterprises as well as an increase in supply of forestry products and non-timber forest products (NTFP) for rural populations. Moreover, the NAMA will make important contributions to achieve 8 of the 17 Sustainable Development Goals (SDGs) of the new Agenda 2030 for sustainable development that was adopted by the United Nations (UN) in September 2015.

The NAMA builds on past and current Government efforts to restore degraded forests and land. Agency Moldsilva, the central public authority in the forestry sector, has extensive experience in afforestation programmes and projects, including in projects with a focus on carbon sequestration. The Agency has successfully implemented two afforestation projects within the framework of the Clean Development Mechanism (CDM). However, most of the remaining degraded land that is suitable for afforestation is communal land under the administration of Local Public Authorities (LPAs) which do not have sufficient human and financial resources to scale up afforestation activities. Moreover, illegal logging affects the

integrity of existing and newly established forests if resources and incentives to manage and protect them are not provided. Hence, the NAMA targets afforestation on degraded communal land and will support communities to enhance capacities, skills and resources that are needed to ensure long-term sustainability of afforestation activities and land restoration measures.

Within the NAMA framework, a comprehensive set of measures will be developed and implemented to successfully scale up afforestation and land restoration at the national level. In addition to a national Afforestation Programme, measures include a Capacity Building Programme for local communities to increase their skills and participation in afforestation and forest management activities, a Market Development Programme to promote SME that sell forest and NTPF as well as services related to forest production and management; and the establishment of a finance mechanism for afforestation, sustainable resource management and SME development.

To reach its target, the NAMA will use a phased approach consisting of three phases to gradually enhance the capacities of local communities to engage in afforestation, forest management and the development of forest-based SME:

To enable the successful implementation of the proposed NAMA components, a NAMA finance mechanism will be set up and implemented to collect funds from national and international sources that will be made available through different financial instruments. The main funding sources for NAMA implementation are expected to be national public funds and international grants. The preliminary cost estimate for implementing the NAMA is € 116.7 million. Of this amount, € 31.2 million are expected to come from national and € 85.5 million from international sources. National public funds and international grants will be the main funding sources of the Afforestation Programme. A certain percentage of the grants for afforestation could be issued in the form of result-based payments for carbon sequestration through afforestation. Moreover, international grants will be used to establish a revolving loan fund for SME development and to support sustainable resource management activities of communities such as the implementation of improved pastures, production of NTFP and land restoration measures.

For the implementation of the NAMA, an institutional framework will be established involving all institutions that are needed to develop, implement and manage the NAMA programme which is cross-sectoral and covers a broad range of topics such as land restoration, mitigation of climate change, market development and finance. The Ministry of Environment will lead and supervise the NAMA implementation process through a National NAMA Implementation Unit, since the NAMA will be implemented within the framework of international climate policy. Agency Moldsilva, in cooperation with local communities and other relevant organizations, will implement the four components of the NAMA: the Afforestation Programme, the Capacity Building Programme, the Market Development Programme, and finance mechanism establishment. A national NAMA MRV framework is currently being developed by the Government and will be finalized in December 2016.

1 INTRODUCTION

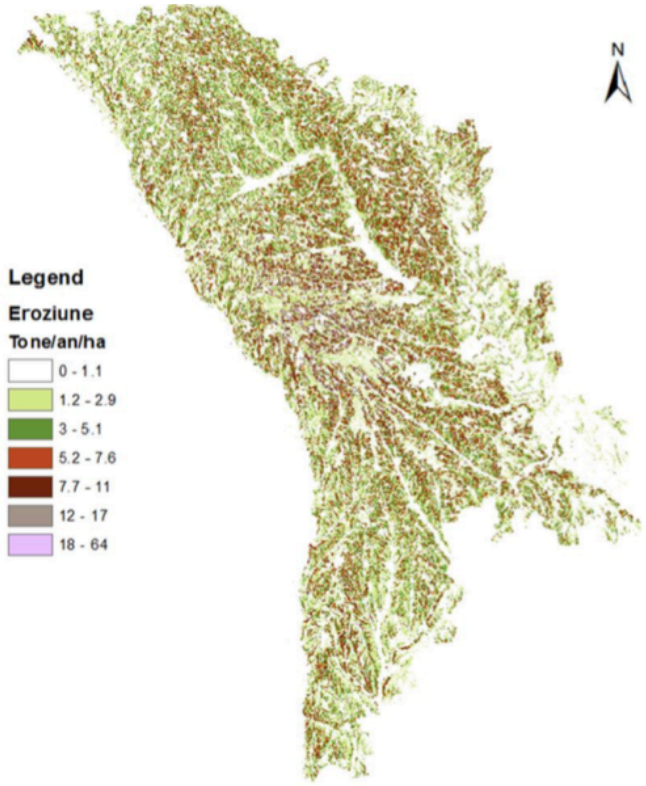
Forests are of great importance for sustainable development in the Republic of Moldova. They provide timber and non-timber forest products (NTFP), particularly for the rural population, as well as ecosystem services such as soil protection, biodiversity conservation, and carbon sequestration. However, forest resources are under pressure from a number of sources. Many rural households - about 60% of the 3.55 million Moldovans live in rural areas – depend on firewood for heating and cooking because they cannot afford to use electricity or gas. Constantly rising energy prices for local end consumers 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 are 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. Article 2 of the Law on improvement of degraded land through afforestation (Law no. 1041 from Jun. 15, 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 by chemicals and oil.

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). As shown in Figure 1, the areas that are most severely affected by erosion are located in Central and Northern Moldova. 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 (Ministry of Environment, 2013).

Figure 1. Land affected by different levels of soil erosion (presented as annual erosion in tonnes per hectare)



Source: UNFCCC (2008)

The Government of Moldova is making great efforts to halt land degradation and to increase the national forest cover. The national 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 farmland buffer strips up to 100%." It sets the target to increase the national forest cover to 15% by planting 150,000 ha of forests, 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. Moreover, 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.

The two-decade long experience in afforestation and forest management of Agency Moldsilva will be decisive in the development and implementation of afforestation activities within the NAMA framework. The Agency has implemented a number of programmes and projects with the objective to restore degraded land, to establish new forests and sequester carbon. This includes, 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 Moldova Soil Conservation 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: Forest Research and Management Institute /Project Implementation Unit

The Moldova Community Forestry Development Project, Moldova's second CDM project, established new community forests on about 8,468 ha by means of afforestation of eroded and unproductive land, application of agro-forestry practices and the creation of forest protection belts (UNFCCC, 2010). Both CDM projects passed all national and international procedures for registration, validation and verification. After its first verification in 2012, the Moldova Soil Conversation Project obtained temporary certified emission reductions (tCERs) equivalent to 851,900 tCO_2. In 2013, the Moldova Community Forestry Development project obtained 328,800 CERs. Another projects with relevance for the NAMA is being carried out in the National Park Orhei where integrated pasture and community forest management systems are being established (UNDP, 2013). This included the rehabilitation of 500 ha of pastures and afforestation of 150 ha of eroded, non-productive land, and inventory of communal grassland as well as the development of forest management plans for 18 communities.

An important programme that has been launched to combat illegal logging is the ENPI (European Neighbourhood and Partnership Instrument) East (East Countries) FLEG II (Forest Law Enforcement and Governance Program II) which aims to improve forest law enforcement and governance (ENPI FLEG, 2016). Moldova is one of seven countries that participate in the programme. Specific national objectives of the programme are to tackle the drivers of illegal logging and associated trade and corruption and to reduce pressure on forests due to growing demand for forest products and services.

2 BACKGROUND INFORMATION ON THE MOLDOVAN FORESTRY SECTOR

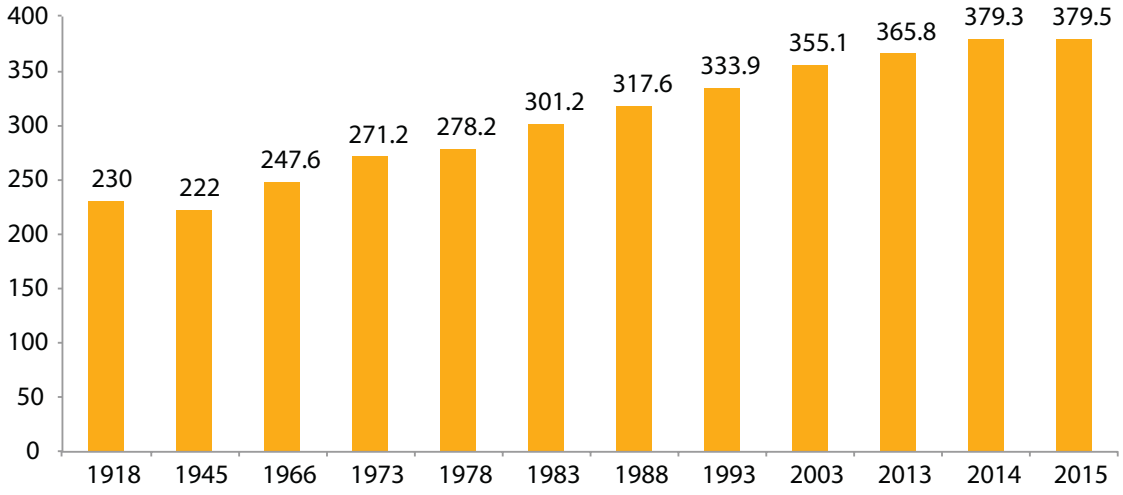
The Republic of Moldova is located in Southeast Europe, bordering Romania and Ukraine. The country is divided into 32 districts or raions, 5 municipalities (Chisinau, Balti, Comrat, Bender and Tiraspol) and 2 territorial units (Autonomous Territorial Unit Gagauzia and Transnistria). Moldova has a population of 3.55 million of which about 58% live in rural areas (Statistica Moldovei, 2016). In 2015, the average monthly income per capita was 2350 lei (117 €) in urban areas and 1658 lei (82 €) in rural areas (Statistica Moldovei, 2016). According to the World Bank, the country is classified as a lower-middle income country where about 11% of the population lived below the national poverty line in 2015. In recent years, the Government has succeeded in significantly reducing the poverty rate from about 30% in 2006[1].

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 is covered by forests, which remain under high pressure from human activities as well from biotic and abiotic factors.

1 http://data.worldbank.org/country/moldova#cp_wdi

Figure 3. Forest cover development in the Republic of Moldova (in '000 ha)

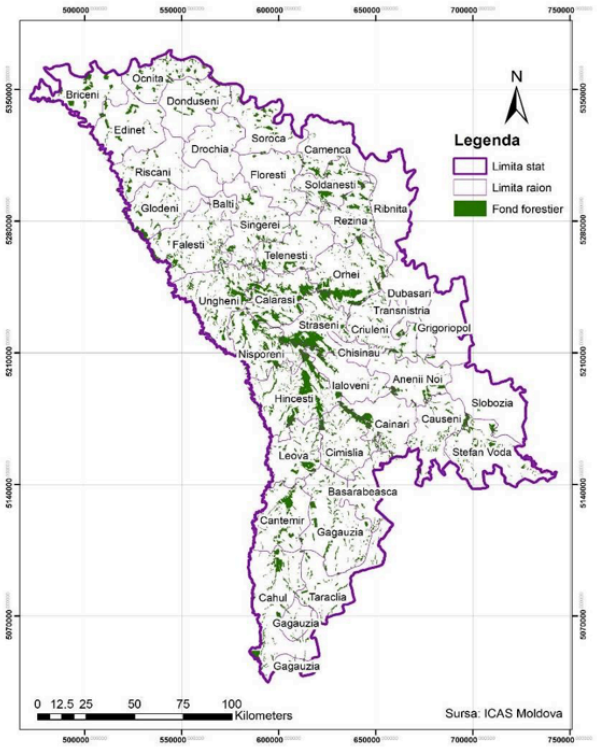


Source: Moldsilva and National Land Cadaster as of 01.01.2015

Many forests are located in hilly regions and are unevenly distributed throughout the country. The largest part of the Moldovan forest is situated 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. 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 functions that would benefit the environment, create comfortable living conditions for the population and provide NFTP.

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 1990's by the population in search of firewood (Galupa, D. et al., 2011). With the degradation and disappearance of protection belts, important ecosystem services have been 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.

Figure 4. Distribution of forests in the Republic of Moldova



Source: Forest Research and Management Institute (FRMI or ICAS in Moldovan)

The Moldovan Forest Code (article 2) defines the "fondul forestier national" – translated literally as "national forest fund" or forest 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". National forest fund lands under state ownership represent the largest share of the forestland (86.6%), while the rest (14.5%) is publicly owned and administered by Local Public Authorities (LPAs) or has private owners (0.9%) (Table 1).

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

Category of owners	Total national forest fund area in '000 ha (%)	Area covered with forests in '000 ha (%)
National forest fund under state public property	349.7 (84.6)	328.6 (86.6)
National forest fund under public ownership (community forests)	60.1 (14.5)	48.3 (12.7)
National forest fund under private ownership	3.6 (0.9)	2.5 (0.6)
Total	413.5 (100)	379.5 (100)

Source: National Land Cadastre as of Jan. 1, 2015

Approximately 50,000 ha of forest vegetation are not covered by the national forest land definition. This includes 30,500 ha of protection forest belts in agricultural systems and riparian buffer stripes. A large part of these forest plantations are 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 mostly small and scattered around rural and urban settlements and are often degraded due to illegal logging, grazing and waste pollution. This situation is the result of changes in the forestry sector after the declaration of independence of Moldova in 1991. The socio-political change during that period entailed the transfer of former kolkhoz forests into management by municipalities (LPAs), who had neither experience nor specialized staff to ensure their protection and sustainable management. To date, only 15% of community forests have forest management plans (Botnari, F. et al, 2011). According to article 9 of the national Forest Code, LPAs have certain obligations regarding management of their forests, which includes organizing and coordinating usage, regeneration and protection of forest vegetation. Moreover, it states that LPAs and Moldsilva have to cooperate towards the maintenance of community forest vegetation but the scope or protocol of such cooperation is not clearly defined (World Bank, 2014).

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 SFEs subordinated to Agency Moldsilva. 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 wood processing machinery is often obsolete and not all units operate efficiently. 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 (Mocanu, V, 2015).

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 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 a low level of 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 m3 per year, representing approximately 80% of the annual increment of forests vegetation (Galupa, D. et al., 2011). A large percentage of firewood is harvested illegally. Many households rely on illegally harvested firewood which is cheaper than firewood from legal sources. The value of the illegal harvest is conservatively estimated to be USD 15–17 million annually (World Bank, 2014).

To address illegal logging, a Forestry Policy Note prepared by the World Bank (2014) highlights a set of measures. At the state level, an institutional reform of forest sector institutions is proposed that separates management from control and regulatory functions and strengthens the regulatory and monitoring capacity of forest authorities. A national Strategy for Institutional Reform of the Forestry Sector in Moldova was prepared in 2012 but has not yet received approval by the Government. At the local level, additional measures are highlighted, including an increase of the volume of wood for heating and cooking, improved

management and protection of community forests and the provision of alternative and affordable sources of energy for the local population. Moreover, within the ENPI FLEG Moldova program, a report was prepared that provides a range of recommendations on how to tackle the problem of illegal logging in the Republic of Moldova. Table 2 summarizes the recommendations.

Table 2. Recommended actions to tackle illegal deforestation

Field of action	Description
Legislative	■ Improve current legislation, especially legislative and normative acts concerning the protection, management and use of forest resources ■ Increase sanctions for contraventions in the forestry sector so that the amount of fines and/or size of punishment is correlated with the gravity of deed
Economic and financial	■ Improve financial conditions of the national forestry sector and increase the amount of state budget allocations to the sector ■ Increase the pay level of staff in the forestry sector to reduce their involvement in corruption schemes ■ Build and enhance forest sector infrastructure
Institutional actions (capacity building)	■ Ensure adequate training for staff/specialists based on the needs of the national forestry sector as well as on national and international trends
Technological actions	■ Eliminate incorrect inventory and planning practices, such as the underestimation of wood volumes and quality of wood ■ Ensure full implementation of forest management plans ■ Provide equipment for the implementation of activity control and security measures ■ Shift to new/improved technologies for forest management and conservation
Right to logging and/or trading	■ Ensure efficient control and verification processes of logging activities, including activities performed by public/private agencies that have obtained logging rights through auctions ■ Eliminate price manipulations in timber auctions to keep prices stable for poor rural households
Control and monitoring of logging, transportation, processing and import-export	■ Develop a transparent control and monitoring system for all steps from tree selection over harvest to timber sale ■ Include civil society organizations in the monitoring process to ensure its credibility
Social	■ Make the provision of wood products and forest services a priority in the fight against rural poverty ■ Ensure broad participation of civil society in decision making and planning processes of forest sector activities

Field of action	Description
Forestry policy	■ Promote community forestry development to meet the objective of forest expansion at national level ■ Consider measures for sustainable pasture management in forest management planning
Special actions to prevent and fight corruption	■ Implement national forestry policies on preventive actions against corruption ■ Develop and implement an anti-corruption mechanism based on (1) state agencies and government facilities that have the power and willingness to stop corruption; (2) enhanced capacities to investigate and prosecute cases of illegal logging, (3) independent media that reports on issues related to corruption

Source: Galupa, D. et al. (2011)

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 that own forests and other institutions owning minor forest vegetation, are the principal entities comprising the institutional framework of the forestry sector. The following section gives 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 administrative authority, subordinated to the MoEN. Moldsilva exercises the functions of implementation and promotion of state policy in the field of forestry and hunting by carrying out activities related to afforestation, forest regeneration and conservation, ecological restoration, management of forest resources, enforcement, protection and development of national forests and wildlife. 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 Forest Enterprises (SFE) for Silviculture, four SFEs 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.

National Environmental Fund (NEF). The Fund was created in 1998 by the Moldovan Government as a key instrument for financing the implementation of environmental policies. The Fund is institutionally situated in, and directly subordinated to, MoEN. Eligible for funding are activities that contribute to the implementation of national strategies, programmes and plans for the following areas: air quality control, waste management and sanitation, water supply, sewage and protection of water resources, restoration and new establishment of forests and green areas, prevention of landslides and soil erosion, conservation of biological diversity, scientific research, prevention of natural disasters, awareness raising, financial contributions to international agreements and conventions. Local public administration bodies, institutions, enterprises and civil society organizations from Moldova may apply for grants (NEF, 2016). Currently, existing environmental pollution charges earmarked in the Law on Payment for Environmental Pollution, constitute the main revenue source of the Fund. It mobilizes on average € 15 million per year which allows implementation of only a limited number of environmental protection activities.

Local Public Authorities (LPAs). 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 use, management, 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 Cadaster. The Agency of Land Relations and Cadaster 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 cadaster, 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 Objective of the NAMA

The NAMA on Afforestation of Degraded Land, Riverside Areas and Protection Belts in the Republic of Moldova is a supported NAMA. 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 afforestation and forest belt establishment targets were set by Moldsilva and reflect their capacities and the capacities of local communities for afforestation of degraded land and the establishment of forest belts. Moreover, the NAMA seeks to strengthen capacities of local communities to afforest degraded land, to sustainably manage their forests and pastures and to engage in development of forest-based SME. The NAMA will sequester 2.13 Mt CO_2e until 2030 and a total of 5.15 Mt CO_2e over a 30-year period.

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 and to promote forest-based income opportunities for the rural population (a detailed description of measures and activities is provided in chapters 5.1, 5.3 and 6). The proposed NAMA activities are in line with past and current projects and Government strategies on afforestation and land restoration, such as the two CDM projects and the Environmental Strategy for 2014-2023. Moreover, NAMA activities build on recommended actions for sustainably forest sector development in Moldova, presented in the Forestry Policy Note by the World Bank (2014) which was elaborated in close cooperation with Agency Moldsilva and other forestry sector institutions. In the documents, the following actions are identified as high priority actions to promote forestry sector development:

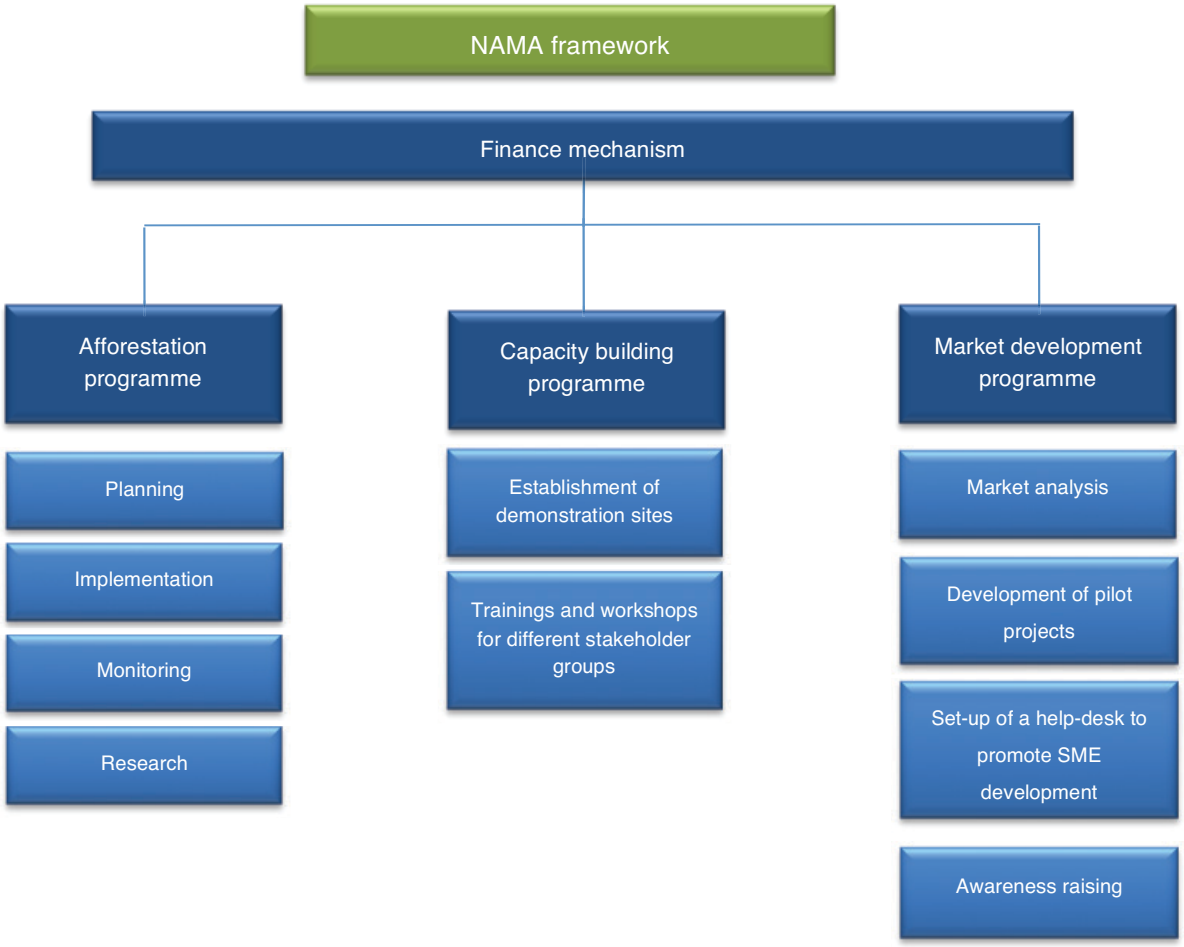
- Engaging the private sector through the development of rurally based SMEs that provide services in areas such as afforestation, harvesting and other forest activities (e.g. marketing of NTFP);
- Ensuring a sustainable wood supply by afforestation with short-rotation, high yielding forestry energy crops;
- Building and maintaining stable and diversified forests to contribute to climate change adaptation and mitigation;
- Implementing a series of regionally based afforestation projects to address land degradation, create job opportunities, improve agricultural production and eventually reduce demand for illegally produced wood (World Bank, 2014).

The NAMA framework has four components, each of which consists of a set of measures to promote the large-scale implementation of afforestation of degraded, unproductive land (Figure 5). The components include:

1. Afforestation Programme to plan, implement and monitor afforestation activities on 61,500 ha of land;
2. Capacity Building Programme to strengthen the skills and knowledge of local communities on afforestation and sustainable resource management;
3. Market Development Programme to promote the development of forest-based SMEs;

4. NAMA finance mechanism that will be established to secure long-term finance for activities to be developed under the four NAMA programmes as well as to create incentives for local communities to engage in afforestation and sustainable management of natural resources. The main funding sources for the implementation of NAMA activities will be national public funds and international grants. Grants will be used to establish a revolving loan fund for SME development and to promote sustainable resource management in local communities.

Figure 5. Components of the NAMA on Afforestation of Degraded Land, Riverside Areas and Protection Belts Restoring Degraded Land



Source: own elaboration

However, a lack of finance is not the only barrier to the scaling up of afforestation activities. An equally important barrier is the lack of capacities and skills of LPAs and local communities to afforest degraded land and to manage forest resources. While Moldsilva has highly skilled staff for the management of state-owned, forested land, LPAs do not have the same resources at their disposal. The NAMA Afforestation and Capacity Building Programmes will be implemented to enable communities to restore and sustainably manage their forests in the long-term by providing training on all aspects that are relevant for planning, implementation and monitoring of forestry activities. This includes the preparation of forest management plans for existing and newly established forests, which are currently only available for a small fraction of community forests.

Moreover, the Capacity Building Programme will improve farmers' knowledge on pasture management since the lack of adequate feeding sources for cattle is an important driver of forest degradation. This measure is also intended to create an incentive for local communities to engage in afforestation because cattle is an important source of income in many communities and the establishment of forest plantations could be seen as a competing activity that reduces the availability of pastureland. Farmers will learn how to increase the productivity of existing pastureland, for example, by improving pasture management practices or by introducing improved pasture species in order to free land for afforestation. The Market Development Programme is planned as another incentive measure to increase communities' interest to participate in afforestation and forest management by developing SME based on forest resources that will be produced under the Afforestation Programme. This will require capacity building of local personnel, market research and investments in technology, as well as the development of more efficient supply chains.

2.4 Barriers to afforestation of degraded land

2.4.1 Economic and financial barriers

In the Republic of Moldova, the implementation of afforestation and land restoration programmes and projects is severely restricted by a lack of public finance[2]. The National Ecological Fund (NEF), the main financing tool for the implementation of environmental policy, constitutes only 0.2% of the total national budget. In 2015, for example, NEF had accumulated 233,5 million MDL (about € 12 million) which were allocated to 350 projects. Among those 350 projects, 267 were projected in the field of potable water supply and sewerage systems; 28 projects covered scientific investigation and awareness raising; 18 projects were approved for greening territories and expanding forests (including greening of parks and public squares and afforestation of degraded land); and 10 projects received finance for disaster prevention. For the implementation of the "National Plan for extension of forest coverage for 2014-2018", which has the objective to afforest 13,050 ha of land and is among the 18 projects that were granted funding for greening territories and expanding forests, 1.3 million € were approved. However, funds have not been distributed yet.

The lack of state budget for environmental activities 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 3). 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 to 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).

2 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 of this section.

Table 3. 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: own elaboration, based on data provide by Moldsilva, available at: www.moldsilva.gov.md

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 SFE (revenues and expenditures of forestry activities and forestry industry are summarized in Table 4). In recent years, additional income was derived from the sale of carbon credits generated by the Moldova Soil Conservation Project, the Moldova Community Forestry Development Project and a third non-CDM afforestation project that sold voluntary carbon credits. However, Moldsilva's annual expenditures exceed annual revenues, limiting opportunities for forest sector investments.

Table 4. 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: own elaboration, based on data provide by Moldsilva, available at: www.moldsilva.gov.md

Moldsilva's investments in the forestry sector are further 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 and to implement measures to reverse land degradation. 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.

Table 5 provides a summary on economic and financial barriers and activities that will be implemented within the NAMA framework to remove barriers.

Table 5. Overview on economic and financial barriers and NAMA activities planned to remove barriers

Barrier	NAMA activity	Description
Lack of finance to implement large-scale afforestation programmes	Finance mechanism: grant	In addition to financial resources from the state budget, the Government intends to raise international support to finance three NAMA programmes
Lack of access to credit	Finance mechanism: revolving loan fund	A revolving loan fund will be established to provide finance for investments in sustainable natural resource management and SME development

Source: own elaboration

2.4.2 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 and the electricity 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 2.1 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 cannot afford 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% of pastures 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.

An important barrier to afforestation of degraded land will be the lack of willingness and ability of communities to dedicate part of their degraded land to afforestation when it is 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 because of the shortage of fodder and the important contribution of livestock products to the household income. Restoration of degraded land through afforestation activities will unlikely be successful if the problem of pasture shortage and degradation is not treated in parallel. Incentives will have to be offered to communities, such as the introduction of improved pastures, 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. Planning at the landscape level will be necessary to effectively tackle the drivers of land and forest degradation.

Table 6 provides a summary on socio-economic barriers and activities that will be implemented within the framework of the NAMA to remove barriers.

Table 6. Overview on socio-economic barriers and NAMA activities planned to remove barriers

Barrier	NAMA activity	Description
High unmet demand for forest resources	I. Afforestation programme II. Capacity building programme III. Market development programme	I. (a) To increase the availability of forest resources and services, afforestation of 45,000 ha of degraded land and establishment of 15,000 ha of riparian forest belts and 1,500 ha of protection forest belts in agricultural systems will be promoted; (b) A healthy balance of species for restoration and conservation purposes and trees that meet short-term needs of communities will be used. II. A series of trainings and workshops will be offered to local communities to build local capacities to perform all tasks related to afforestation and forest management. III. By creating SME, the Market development programme intends to formalize the trade with forest products and NTFP and to ensure that commercialization of these products happens within thresholds of sustainability.
Illegal harvest of wood	I. Afforestation programme II. Capacity building programme	I. For all areas to be afforested under the NAMA programme, forest management plans will be prepared (these plans are currently lacking for most community forests). II. Selected staff in communities will receive training to be able to enforce forest management plans, i.e. to carry out all activities related to planning, harvesting, forest protection and monitoring.

Barrier	NAMA activity	Description
Cattle grazing in forests may threaten newly established forest plantations Lack of willingness of communities to afforest degraded land if it used as pastureland	I. Afforestation programme II Capacity building programme	I. For the preparation of forest management plans, an integrated planning approach will be adopted to consider the needs of rural communities for pasture. Where possible, silvopastoral systems will be established (silvopastoral systems are a combination of trees and/or shrubs with pasture). II. Communities will receive training on the establishment of pastoral systems and improved pastures as well as on practices of improved pasture management.
Lack of affordable (alternative) sources of energy	I. Afforestation programme II. Market development programme	I. (a) A healthy balance of long-rotation species for restoration and conservation purposes and short-rotation species that meet communities needs for firewood will be used. An increase of supply of firewood will help to keep prices stable or even bring down prices; (b) the Afforestation programme will help to increase the income of rural households by providing employment opportunities in all activities related to afforestation and forest management. II. The Market development programme will increase income opportunities for rural households through the creation of forest-based SME. Additional income will help to pay for electricity and gas, which have 100% coverage in rural areas of Moldova.

Source: own elaboration

2.4.3 Environmental barriers

The stability and functioning of many forest ecosystems in Moldova has been disturbed. Notably, 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.

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 climatic 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 about 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. Tree species selection will be important to build healthy and resilient ecosystems that can also withstand current and future threats such as climate change.

Table 7 provides a summary on environmental barriers and activities that will be implemented within the framework of the NAMA to remove barriers.

Table 7. Overview on environmental barriers and NAMA activities to remove barriers

Barrier	NAMA activity	Description
Threats from biotic factors e.g. pests	I. Afforestation programme	I. (a) Tree species will be selected based on current and expected site conditions to create healthy and resilient forest ecosystems; (b) Forest management plans will include preventive actions to limit threats from biotic factors.
Negative impact of climate change on forest plantations	I. Afforestation programme	I. The potential impact of climate change on tree growth and health will be an important criterion for the selection of species for the Afforestation programme. Tree species will be selected to match with current and expected site conditions as much as possible.

2.4.4 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 constraint. Moreover, many communal lands that were afforested by Moldsilva during 2002-2010, have not yet been returned to the LPAs for management. 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. These efforts will have to be increased by Moldsilva and/or other entities that are active in the field of afforestation, 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 adequate feeding sources, especially of improved pasture, is an important driver of soil and forest degradation in rural communities. Better knowledge by 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.

Moreover, additional research 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 has generally focused on the relatively short term 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 and a lack or inconsistency of dissemination of results to the forestry state authority limits the effectiveness of the forestry research.

Table 8 provides a summary on technical, capacity and information barriers and activities that will be implemented within the framework of the NAMA to remove barriers.

Table 8. Overview on technical, capacity and information barriers and NAMA activities to remove barriers

Barrier	NAMA activity	Description
Lack of human capacity for afforestation and forest management	I. Capacity building programme	The programme will offer a series of trainings and workshops to local communities targeted at building local capacities to perform all tasks related to afforestation and forest management.
Lack of forest management plans for community forests	I. Afforestation programme	Forest management plans will be developed for all areas to be afforested under the NAMA programme.
Lack of knowledge on improved pasture management	I. Capacity building programme	The programme will offer trainings and workshops on improved pasture management to local communities.
Lack of forestry research with a long-term focus	I. Afforestation programme	Research activities will be carried out within the programme, to evaluate its social, economic and environmental impact.

Source: own elaboration

2.4.5 Legal, regulatory and institutional barriers

In accordance with Article 15 of the law on improvement of degraded land through afforestation, 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 regulatory barrier to afforestation of degraded communal land and the effective management of LPA-owned forests is the lack of a clear definition of the roles of LPAs and Moldsilva in these activities. According to the Forest Code, LPAs have certain obligations regarding the management of their forests, such as organizing and coordinating usage, enforcement, 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 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 anthropogenic 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 Moldsilva, Ministry of Environment, 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.

Table 9 provides a summary on legal, regulatory and institutional barriers and activities that will be implemented within the framework of the NAMA to remove barriers.

Table 9. Overview on legal, regulatory and institutional barriers and activities that will be implemented within the framework of the NAMA to remove barriers

Barrier	NAMA activity	Description
Lack of a clear definition of the roles of LPAs and Moldsilva regarding afforestation of degraded land	I Afforestation programme	I. Under the NAMA framework, communities will decide if they want to participate in the Afforestation programme and which communal land should be afforested. If they decide to transfer land for afforestation to Moldsilva, contractual arrangements are made between both parties which define their roles and responsibilities.
Lack of coordination and synchronization of policies and activities related to the use and conservation of natural resources.	Establishment of an institutional framework for the development and implementation of the NAMA	An institutional framework will be established involving all institutions that are needed to develop, implement and manage the NAMA which is cross-sectoral and covers a broad range of topics such as land restoration, mitigation of climate change, market development and finance.

Source: own elaboration

2.4.6 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 different factors.

The forestry industry is dominated by the Moldsilva-operated SFEs 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. Communities in particular lack skills and experience in the development of forest-based SME. 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.

Promoting the development of forestry-based 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.

Table 10 provides a summary on barriers to market development and activities that will be implemented within the framework of the NAMA to remove barriers.

Table 10. Overview on barriers to market development and NAMA activities to remove barriers

Barrier	NAMA activity	Description
Communities lack skills and experience in the development of forest-based SME	I. Capacity building programme II. Market development programme	I. The programme will offer trainings on relevant topics for SME development, including sustainable harvest practices, quality management of products, use of technologies for harvest and processing, marketing and sales strategies and financial planning. II. (a) Under the programme, market analysis will be carried out to identify products and services with the largest potential for forest-based SME development; (b) a help-desk will be set up to support local communities with the development of SME, including with the preparation of business plans, the set-up of business infrastructure and access to financial services.

Source: own elaboration

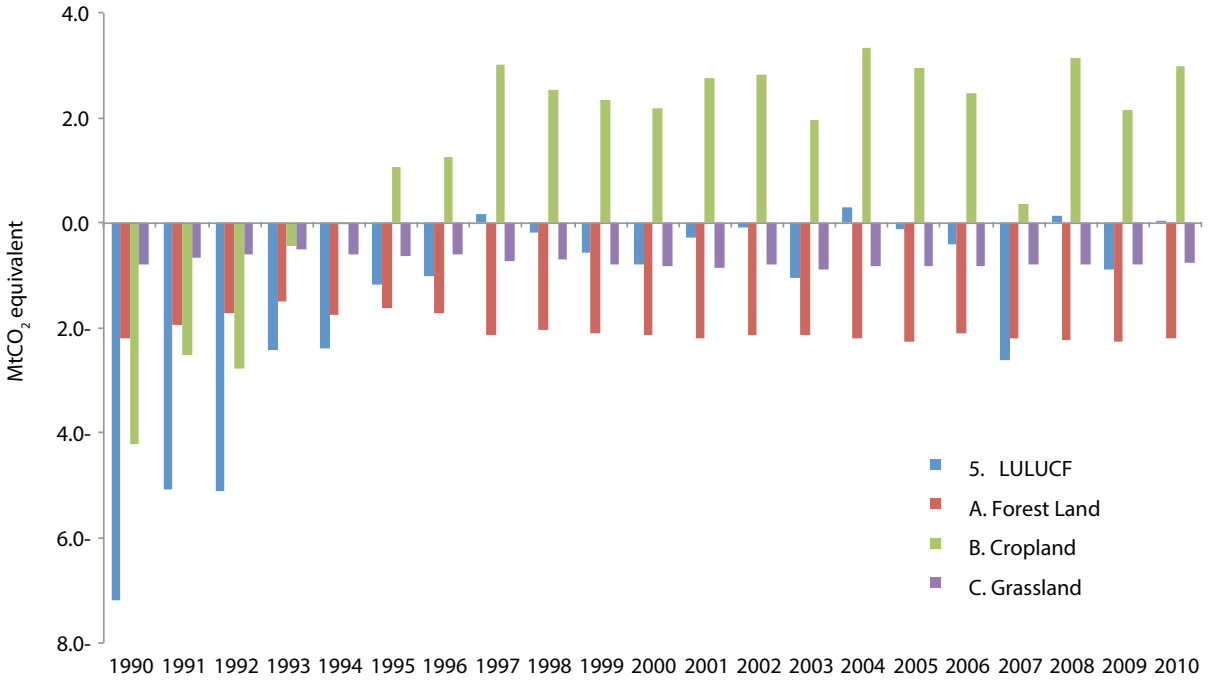
3 POLICY ANALYSIS

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 sink during the period of 1990-2010 (Figure 6). 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 and substantial increase of illegal logging, 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 6. Emissions/removals in the LULUCF sector by source and sink categories between 1990-2010*



Source: MoEN (2013)

* Positive values on the y-axis indicate removals while negative values indicate emissions in the LULUCF sector.

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, the net removal target is to increase GHG emission reduction 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 rehabilitation of 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.

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". Sectoral GHG emission reduction targets are not provided.

Post-2020 mitigation policies framework

By mid-2016, the Government will prepare a new draft LEDS for 2030. After consultations with relevant line ministries, the LEDS will be subject to approval by the Government by end of 2016. As noted 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 other national and sectoral strategies, policies and programmes

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 "*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). However, Moldsilva is currently lacking funding for its full implementation. To date, about 2,500 ha have been established.

Destroyed belt unable to perform its protective function

4 BASELINE INFORMATION AND NAMA TARGETS

4.1 NAMA boundaries

The NAMA on Afforestation of Degraded Land, Riverside Areas and Protection Belts Restoring Degraded Land through Afforestation promotes afforestation activities on eligible land throughout the country, except for the eastern territories of Transnistria.

Figure 7. Administrative territorial map of the Republic of Moldova

Source: MoEN (2013)

The exact location of the land for afforestation and the establishment for of forest belts under the framework of the NAMA cannot be determined by Moldsilva at this stage of NAMA development. This is due to the fact that a large percentage of the degraded land for afforestation is located on territories of LPAs who have to decide which degraded lands they want to set aside for afforestation in their communities. Land will be selected at the beginning of NAMA Phase I.

According to the national regulatory framework, afforestation activities are carried out by Moldsilva and LPAs. However, afforestation on community land is often conducted by Moldsilva since many communities lack resources and knowledge to carry out the work by themselves. In the case of the NAMA, Moldsilva will also take the lead in afforestation activities, at least during NAMA Phase I, while communities receive training on afforestation and forest management.

If Moldsilva afforests community land, contracts are signed between LPAs and Moldsilva permitting the agency to carry out afforestation work and to manage forest plantations for a certain period of time. 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. 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.

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.

4.2 GHG baseline

Within the framework of the NAMA, 61,500 ha of degraded land will be afforested between 2017-2030 at an annual afforestation rate of 4,393 ha. The calculation of the direct GHG mitigation potential of the NAMA is preliminary because the final project sites for afforestation will be determined during NAMA Phase I. Site conditions, species selection, rotation length and forest management will determine the net GHG removals by sinks.

The calculation of the GHG mitigation potential is based on field data reported by the two CDM projects, the Moldova Soil Conservation Project (UNFCCC, 2008) and the Moldova Community Forestry Development Project (UNFCCC 2012). The CDM projects 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 while operating at national scale. The projects were developed in line with the provisions of the CDM methodology AR-AM0002 "Reforestation of degraded lands through afforestation/ reforestation" (UNFCCC, 2009).

Regarding the selection of a baseline scenario, the CDM MCFD Project regards a scenario in which degraded lands are abandoned and degrade further as the most likely scenario. Without direct intervention, degraded lands are prone to severe forms of landslides and erosion that result in further degradation. Afforestation carried out by local communities to reverse the trend of land degradation is not considered as likely due to investment barriers, lack of economic incentives and historic national observations by Agency Moldsilva and the Ministry of Environment that degraded lands have been rehabilitated for agricultural or forestry use to a limited extent. Without external financial support, such as from the CDM projects, Moldsilva and local communities afforested about 1,200 ha of degraded land annually over the last years (Purdon, M. and R. Lokina, 2014). Without interventions to halt soil degradation, the soil carbon is declining on these sites at a rate of 0.75 - 0.87 t C ha^{-1} annually.

For the CDM projects, species were selected based on suitability to soil and climate and adaptability to the sites. On severely degraded lands, naturalized species such as *Robinia pseudoacacia* and, *Gleditsia triacanthos* were used and mixed with native species such as Oak (*Quercus* sp) and poplar species (*Populus alba*, *P. nigra*). On partially degraded sites, native species such as Oak (*Quercus* sp.) and Poplar (Populus alba, P. nigra) were chosen as lead species.

The carbon pools that were considered under the CDM project are above- and below-ground biomass, deadwood, litter as well as soil organic carbon. 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.

According to the CDM methodology AR-AM0002, the average annual change in the carbon stocks is calculated as follows:

$\Delta C_{ijk,t} = [\Delta C_{AB,ijk,t} + \Delta C_{BB,ijk,t} + \Delta C_{DW,ijk,t} + \Delta C_{L,ijk,t} + \Delta C_{SOC,ijk,t}] * [44/12]$, where:

- $\Delta C_{ijk,t}$ = Average annual change in carbon stock in the pools for stratum *i* sub-stratum *j* species *k* in tCO_2 yr^{-1} in year t

- $\Delta C_{AB,ijk,t}$ = Average annual change in carbon stock in the aboveground biomass for stratum i sub-stratum j species k in tCO_2 yr^{-1} in year t
- $\Delta C_{BB,ijk,t}$ = Average annual change in carbon stock in the belowground biomass for stratum i sub-stratum j species k in tCO_2 yr^{-1} in year t
- $\Delta C_{DW,ijk,t}$ = Average annual change in carbon stock in deadwood for stratum i sub-stratum j species k in tCO_2 yr^{-1} in year t
- $\Delta CL,ijk,t$ = Average annual change in carbon stock in litter for stratum i sub-stratum j species k in tCO_2 yr^{-1} in year t
- $\Delta CSOC,ijk,t$ = Average annual change in carbon stock in soil organic matter for stratum i sub-stratum j species k in tCO_2 yr^{-1} in year t
- 44/12 = Ratio of molecular weights of carbon and CO_2 (dimensionless)

Based on this formula and the data input of the two CDM projects, the carbon sequestration potential of afforestation sites established by the NAMA is presented in Table 11.

Table 11. Carbon sequestration potential of afforesting 61,500 ha of degraded land

Number of years	Timeframe	Total accumulated carbon at the end of calculation period (in $MtCO_2e$)	Annual sequestration rate during calculation period (in tCO_2e)
15	2017-2030	2.13	261,682
20	2017-2035	3.36	235,236
30	2017-2045	5.15	154,607

Source: Data provided by Moldsilva

Blossoming *Robinia pseudoacacia*

4.3 Sustainable development baseline and co-benefit targets

The NAMA on Afforestation of Degraded Land, Riverside Areas and Protection Belts Restoring Degraded Land through Afforestation will have an important impact on 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.

By delivering emission reductions and co-benefits, the NAMA will make important contributions to achieving 8 of the 17 SDGs of the new Agenda 2030 for sustainable development that were adopted by the United Nations (UN) in September 2015. The following sections give an overview on the contribution of NAMA activities to different dimensions of sustainable development as well as to the achievement of SDGs.

Ecosystem-based adaptation

Ecosystem-based adaptation is an important co-benefit of mitigation activities carried out under the NAMA framework. Adaptation co-benefits are delivered because 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 therefore improves 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, discussed in Chapters 5 and 6, 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 12 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 12. Linking co-benefits of the NAMA with SDGs and SDG targets

Category	Co-benefits	Indicator	NAMA target	SDG	Selected SDG targets
Ecosystem-based 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	SDG 13. Take urgent action to combat climate change and its impacts	13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries
Environmental benefits	Restoration of degraded land and protection of land from future degradation	number of ha of degraded land afforested	Total: 45,000 ha Annual: 3214 ha	SDG 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss SDG 6. Ensure availability and sustainable management of water and sanitation for all. SDG 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture	15.2 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally 6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes 2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality
		number of ha of riparian forest belts established	Total: 15,000 ha Annual: 1,071 ha		
		number of ha of protection forest belts established in agricultural systems	Total: 1,500 ha Annual: 107 ha		

Category	Co-benefits	Indicator	NAMA target	SDG	Selected SDG targets
		number of ha of degraded pastures restored and number of ha with improved pasture	to be determined during NAMA Phase I		
	Enhancing biodiversity protection	Floral species diversity in project sites relative to control sites	to be determined during NAMA Phase I	SDG 15	15.5. Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species
		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 newly established forests and forest belts with forest management plans	100% of the newly established forests and forest belts	SDG 13 SDG 15	13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning 15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements
		number of people who received training in afforestation and forest management	to be determined during NAMA Phase I	SDG 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all SDG 12. Ensure sustainable consumption and production patterns	8.3 Promote development-oriented policies that support productive activities, decent job creation, entrepreneurship, creativity and innovation, and encourage the formalization and growth of micro-, small- and medium-sized enterprises, including through access to financial services 12.2 By 2030, achieve the sustainable management and efficient use of natural resources

Category	Co-benefits	Indicator	NAMA target	SDG	Selected SDG targets
	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	SDG 1: End poverty in all forms everywhere	1.2 By 2030, reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions according to national definitions
				SDG 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	4.4 By 2030, substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship
	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 Afforestation of Degraded Land, Riverside Areas and Protection Belts 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. As presented in chapter 2.3, the measures and activities are grouped together in four components under the NAMA framework: 1) an Afforestation Programme, (2) a Capacity Building Programme, (3) a Market Development Programme and (4) a finance mechanism. Measures and activities were selected based on the analyses of past and current programmes and activities on afforestation and on barriers to the scale-up of the 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 NAMA will be implemented in a phased approach consisting of three phases summarized below and elaborated in Chapters 5.1 to 5.3 and 6:

- The focus of the "Demonstration Phase" (2016-2018) is to prepare activities planned under the four NAMA components and to start their implementation. 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. Promising business cases for SME development will be selected, business plans will be developed and SME will be set up. 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.

- The focus of the "Scale-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 SMEs 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.

- The focus of the "Transformation Phase" (2024-2030) is to promote forest-based SME development on a large scale based on experience gained from SME development in NAMA Phases I and II and the testing phase of the revolving loan fund. Afforestation on degraded land will continue and activities under the Capacity Building Programme will be phased out.

Building on chapter 2.3, the following chapters 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. Moreover, an overview on NAMA measures and their outcomes, activities and inputs is presented in Annex 1.

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 61,500 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. 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, 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 "Program for valuation of land and increase in soil fertility for 2003–2010".

Visual appraisals will be conducted in the field to assess degradation by applying indicators such as topographic position, presence of gullies and landslides, presence and condition of existing vegetation, etc. During the planning stage, the land for afforestation is selected by Moldsilva and local councils. Since most land will be communal land, the following steps will apply:

- Commissions are established to identify degraded land and to select land for afforestation. Members of the commissions will be comprised of, for example, representatives of local public bodies, technical experts, environmental authorities and representatives of regional forest enterprises.
- Degraded land is selected based on information provided by the Land Cadaster. For the selection of land that is not classified as "degraded" under the Cadaster, 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 to assess degradation by 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,
- If communities decide to transfer land for afforestation to Moldsilva, contractual arrangements are made between both parties.

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. Forest management planning in Moldova is based on five major principles: i) continuity of forest functions, ii) optimal and sustainable exercise of multiple production and protection functions of the forest, iii) optimal and sustainable utilization of forests, iv) principle of aesthetics, and v) biodiversity conservation (World Bank, 2014). Forest management plans will be prepared based on relevant national forest sector policies and regulations. They cover some of the following topics:

- Planning: choice of silvicultural concept, annual allowable cut, mapping, environmental impact assessment, setting of management objectives, management inventory, preparation of working plans;
- Harvesting: pre-harvest prescription, extraction, post-harvest stand management;
- Protection: Control of access, use of chemicals, fire protection;
- Legal arrangement: Concession agreements, logging permits;
- Monitoring and research: Yield control and silviculture, environmental impact studies (FAO, 1998).

In the 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 (NFCO), 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, 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 in line with the national guidelines of scientific forest management and silvicultural practices implemented by Moldsilva 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. (see chapter 5.1.1). As mentioned in previous chapters (see chapter 2.1 and 2.4.4), most communities lack specialized staff for forest management. Hence, building capacities within communities to enable them to independently manage their forests is one of the main focuses of the NAMA. Skills and knowledge related to planning, harvesting, forest protection and monitoring are key requirements to combat illegal logging. During NAMA Phases I and II, it is expected that staff from Moldsilva will closely cooperate with communities in forest management activities. While in NAMA Phase III, responsibilities will gradually be handed over to newly trained staff of communities. Forest management activities at the community level will be developed in line with activities and initiatives carried out at the state level to combat illegal deforestation.

Destroyed forest protection belt

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. Aboveground 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, tree mortality and associated changes in carbon of individual trees. Soil carbon will be measured using temporary plots by taking soil samples to a depth of 30 cm.

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

Natural resource management. 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 series of trainings and workshops to local communities, mainly targeted at building local capacities to perform all tasks related to afforestation and forest management. Additional trainings will cover topics such as including afforestation and land restoration practices and sustainable pasture management. Where relevant, trainings will have a theoretical and a practical element. Trainings will target different stakeholder groups at the local level, notably farmers, farmer associations, forest managers and representatives of LPAs. Training will also be provided to the staff of Moldsilva with a special focus on climate change related topics, for example, implementation of measures to improve the adaptive capacity of forests.

Market development. Capacity building on sustainable forest management will be closely linked to market development since forest management planning will provide information on growth potential of forest products and NTFP by type, species and location as well as on harvesting thresholds. Capacity building on market development will include topics such as sustainable harvest practices, quality management of products, use of technologies for harvest, processing, etc., marketing and sales strategies and financial planning. Target audience of the capacity building programme are people who are already engaged in the formal and informal sale of forest products and NTFP as well as women and men with an interest to start a forest-based SME.

Trainings and workshops on natural resource management and market development will be provided mainly during NAMA Phase I and II.

5.2.2 Demonstration sites

Demonstration sites will be selected to demonstrate afforestation and sustainable forest and pasture management practices during trainings and workshops and to promote their large-scale implementation. Demonstration sites will be selected from previous projects and where good results were achieved, for example in the Moldova Soil Conservation project, the Moldova Community Forestry Development Project and the National Park Orhei project. From these projects, best practice examples will be selected to show the impact of afforestation on land restoration as well as the benefits of improved pasture management. It is expected that the clearly visible difference between degraded and restored sites and the resulting co-benefits will have a positive impact on communities' willingness to participate in afforestation and pasture management activities. Demonstration sites will be established countrywide, dividing the country into three zones: Northern, Central and Southern Zone.

5.3 Market development programme

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 include, for example, nuts, mushrooms, medicinal plants, rosehip and berries. Except for walnuts, which are sold on local and regional markets, 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. Forest products include firewood, poles, logs and sawn wood. 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.

Opportunities to support the development of SME include the following areas:

- forest nurseries,
- afforestation/ reforestation,
- forest management,
- wood processing, and
- sale of firewood, timber and NTFP products.

Market analysis on the potential of SME. At the beginning of the market development programme, a market analysis will be carried out to identify products and services with the largest potential for forest-based SME development. Local, regional and national market opportunities will be assessed as well as the barriers to SME development. A short-list of high-potential products and services is the expected result of the initial market analysis. Moreover, additional market analyses will be conducted throughout the entire lifespan of the NAMA to support the different phases of market development for forest-based products and services, and NTFP, to analyse changes in demand, consumer satisfaction with products as well as new market opportunities.

SME development. Based on the market analysis on SME business opportunities, the most promising business cases will be selected during each phase of the NAMA and SMEs will be developed. Selection criteria are sustainability aspects, i.e. availability of a product and its production potential, job generation potential, demand on local, national and international markets, distance to markets, growth potential and profitability. In addition to capacity building (see 5.2.1), the founders of an SME will receive support to prepare business plans, to set up the business infrastructure, e.g. machinery that is needed for harvest and processing, and to access financial services. With regard to financial services, the revolving loan fund will have a pivotal role in providing seed capital needed to set up and operate SME (see chapter 6). SME development 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. The help-desk could be established within the NFCO, which was established to provide support to community and private forest owners with afforestation and related activities. For the purpose of the NAMA, the responsibilities of NFCO could be extended to cover issues related to forest-based SME development.

Plantation of 6 years, created under Moldova Soil Conservation Project

6 NAMA FINANCIAL MECHANISM AND REQUIREMENTS

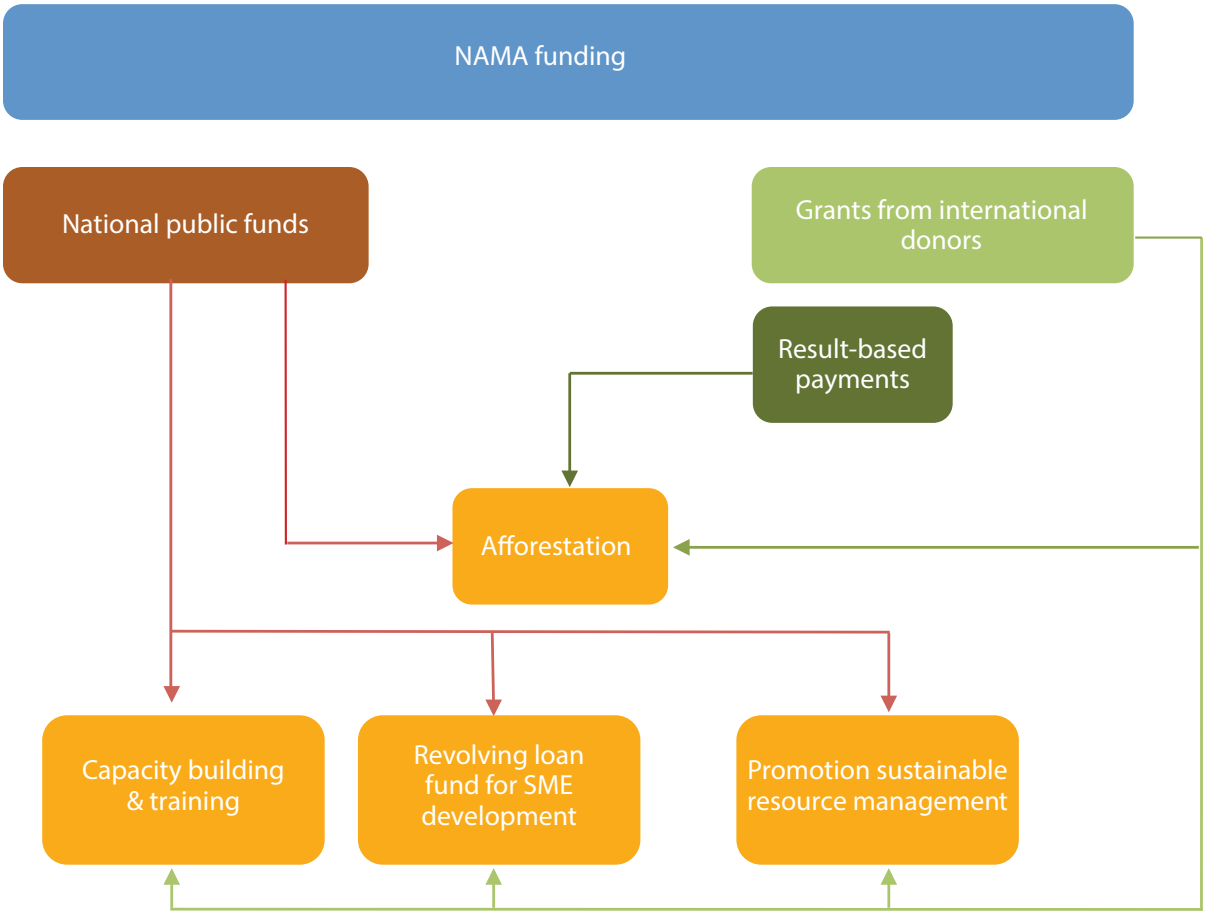
6.1 NAMA financial mechanism and funding sources

Financial analyses carried out under the Moldova Soil Conservation Project (UNFCCC, 2008) and the Moldova Community Forestry Development Project (UNFCCC, 2012) showed that afforestation projects on degraded land are financially not viable at the current market interest rate of 19.5%. The analyses considered all costs of afforestation, including site preparation, planting, maintenance, monitoring and protection. Main benefits considered were fodder and fuelwood. Even under scenarios with carbon payments and interest rates of 10%, afforestation projects on degraded land had negative net present values (NPV) and negative or low internal rates of return (IRR) due to the low productivity of the degraded sites. 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 marginally positive NPV at interest rates below 5%.

Old forest protection belt that required restoration

Moldsilva and LPAs are not able to remove investment barriers to afforestation projects because inexpensive loans from national banks are not available. Hence, the successful implementation of the NAMA Afforestation Programme will depend on the availability of national public funding and international support. To enable the successful implementation of the proposed NAMA programmes, a NAMA finance mechanism will be set up to collect funds from national and international sources. Figure 8 provides an overview on the proposed structure of the NAMA finance mechanism.

Figure 8. Structure of the NAMA finance mechanism



Source: own elaboration

Funding from national and international sources will be made available through different financial instruments. The main funding sources for the implementation of the NAMA activities are national public funds and international grants. They will be used to finance the Afforestation Programme, the Capacity Building and the Market Development Programme. National contributions are expected to principally come from the state budget, budgets of local communities, Moldsilva and NEF.

- **Revolving loan fund.** Grants would be used to establish a revolving loan fund for SME development. The rational of the revolving loan fund is to establish a self-replenishing pool of money, utilizing interest and principal payments on old loans to issue new ones. The fund will provide loans at competitive interest rates and flexible terms that will be tailored to the capital needs of selected forest-based SME categories (e.g. SMEs specialized on NTFP, sale of firewood, nurseries). Detailed terms and conditions of loans will be determined after the market analysis to be carried out within the Market Development Programme during NAMA Phase I. The eligibility of loan applications will be analyzed with regard to a set of financial, social and sustainability criteria, including: profitability of the proposed business, growth potential, availability of a resource and its production potential, job generation potential, demand on local, national and international markets and distance to markets, among other criteria. The revolving loan fund is regarded as an important instrument to create ownership for SMEs and to promote private sector development in the forestry sector.

- **Grants to promote afforestation.** Funding for afforestation and forest management will come from national public funds and international sources. The average cost of afforesting 1 ha of degraded land is about € 1,554 which covers the costs of land preparation, seedlings, maintenance and protection of the newly established plantation. National sources will cover the annual costs of afforesting 1,200 ha, while the Government seeks international support to finance an additional amount of 3,193 ha annually (the total annual afforestation target is 4,393 ha).

- **Result-based payments.** A certain percentage of the grants for afforestation could be issued in form of result-based payments for carbon sequestration through afforestation. In this case, result-based payments, for example, for a predetermined number of hectares afforested or tonnes of CO_2 sequestered, would be given by a donor as a "premium" once the agreed on target has been achieved. The payment could provide cash-flow needed to continue afforestation activities under the Afforestation Programme or to extend activities to degraded land not targeted under the NAMA.

- **Grants to promote sustainable resource management.** In addition to grants for afforestation and sustainable forest management, grants will be provided to support sustainable resource management activities of communities such as the implementation of improved pastures, production of NTFP and land restoration measures. These grants will be provided to communities as an incentive to participate in both afforestation and sustainable resource management activities. They intend to change communities' views on afforestation activities, i.e. afforestation and sustainable resource management activities should be seen as complementing rather than as competing activities. The amount of grants to be received could be made contingent on communities' willingness to participate in afforestation activities.

6.2 Indicative NAMA financing needs

The preliminary cost estimate for implementing the NAMA is € 116,7 million (Table 13). This amount covers the total cost of the Afforestation Programme (NAMA Phases I-III) and the costs of the Capacity Building and the Market Development Programme for NAMA Phase I and II. The costs of these two programmes through NAMA 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. To implement the NAMA, about € 31.2 million are expected to come from national sources and € 85.5 million from international sources.

With regard to afforestation, Agency Moldsilva and local communities afforested about 1,200 ha of degraded land annually over the last years. If no external support were provided between 2017-2030, 16,800 ha of degraded land could be afforested during the 14-year period for a total cost of approximately € 26 million. The technical capacity of afforestation of degraded land would allow to afforest an additional 44,700 ha between 2017-2030, equal to an additional 3,193 ha per year for a total cost of € 69.5 million.

Moreover, without external financial support, the activities proposed under the Capacity Building and Market Development Programme would be only partially implemented due to a lack of national funding. The cost of activities to be developed under both NAMA programmes is about € 21 million for NAMA Phase I and II. Of this amount, € 7.87 million are requested from international donors and would be used to establish a revolving loan fund in Phase II to support the development of forest-based SME. An additional € 3 million would be used as grants to support the sustainable use of natural resources in local communities, e.g. renovation of degraded pasture and the production of NTFP. The rest of the amount would be used for the following activities: € 8.2 million for monitoring and research to be carried out under the Afforestation Programme (Phase I and II), € 2 million for capacity building support for local communities on afforestation and market analysis for SME development (Phase I and II).

Table 13. Indicative NAMA financing needs

NAMA component	Activity	Description	Total cost (€)	Cost Phase I (€) (2017-2018)	Cost Phase II (€) (2019-2023)	Cost Phase III (€) (2024-2030)
Afforestation	Afforestation of degraded land and establishment of forest protection belts	▪ National target: Afforestation of 61,500 ha of degraded land ▪ Annual afforestation target: 4,393 ha ▪ Annual afforestation with national resources: 1,200 ha ▪ Annual afforestation with national support: ▪ 3,193 ha Source: Grant, national public funds	95,574,108 Distribution: 26,107,200 (national) 69,466,908 (international support)	13,653,444 3,729,600 (national) 9,923,844 (international)	34,133,610 9,324,000 (national) 24,809,610 (international)	47,787,054 13,053,600 (national) 34,733,454 (international)
Afforestation	Research and monitoring	Focus of conducting 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. Source: Grant, national public funds	8,240,000 4,120,000 (national) 4,120,000 (International)	6,615,000 3,307,500 (national) 3,307,500 (international)	1,625,000 812,500 (national) 812,500 (international)	to be determined in Phase I or II

NAMA component	Activity	Description	Total cost (€)	Cost Phase I (€) (2017-2018)	Cost Phase II (€) (2019-2023)	Cost Phase III (€) (2024-2030)
Capacity building and training	Training of local communities on sustainable resource management	Local communities will receive training based on demand on different topics such as afforestation, forest management planning and pasture renovation. Source: Grant, national public funds	750,000 375,000 (national) 375,000 (international)	250,000 125,000 (national) 125,000 (international)	500,000 250,000 (national) 250,000 (international)	to be determined in Phase I or II
Capacity building and training	Grants for investments in sustainable resource management	In addition to trainings and workshops, grants will be provided to support investments in activities that promote natural resource management in local communities. Source: Grant	3,000,000 (international)	1,000,000 (international)	2,000,000 (international)	to be determined in Phase II
Market development	Establishment of a revolving loan fund	A revolving loan fund will be established to provide capital for investments in SME Source: Grant	7,870,000 (international)	2,870,000 (international)	5,000,000 (international)	to be determined in Phase II
Market development	Market research, help desk	SME development will be support through market research and the establishment of a help desk Source: Grant, national public funds	1,250,000 625,000 (national) 625,000 (international)	500,000 250,000 (national) 250,000 (international)	750,000 375,000 (national) 375,000 (international)	to be determined in Phase II
Total national (preliminary)			**31,227,200**	**7,412,100**	**10,761,500**	**13,053,600**
Total international (preliminary)			**85,456,908**	**14,476,344**	**36,247,110**	**34,733,454**
Total (preliminary)			**116,684,108**	**21,888,444**	**47,008,610**	**47,787,054**

Source: own elaboration

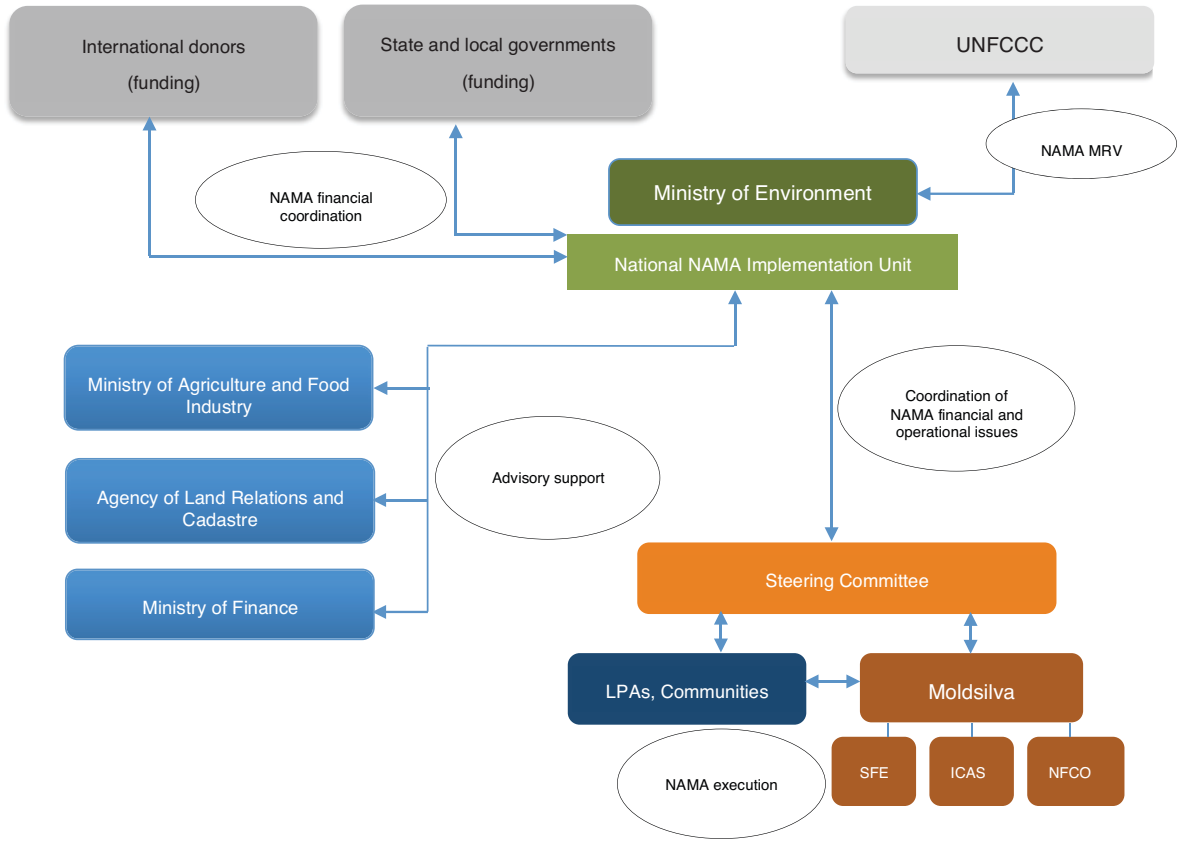
7 INSTITUTIONAL SET-UP FOR NAMA IMPLEMENTATION AND OPERATION

7.1 Description of NAMA operational and financial management system

For the implementation of the NAMA, an institutional framework is being established involving all institutions that are needed to develop, implement and manage the NAMA programme which is cross-sectoral and covers a broad range of topics such as land restoration, mitigation of climate change, market development and finance. Figure 9 shows the proposed structure of the institutional framework.

System of forest protection belts for agricultural fields

Figure 9. Proposed structure of the institutional framework of the NAMA



Source: own elaboration

Ministry of Environment/National NAMA Implementation Unit

- **Responsibilities:** NAMA lead, coordinating body responsible for financial, operational and MRV activities of the NAMA

- Since the NAMA will be implemented within the framework of international climate policy, the MoEN will lead and supervise the NAMA implementation process (for the Afforestation NAMA and other NAMAs) through a National NAMA Implementation Unit. The Implementation Unit is being created by Government Decree.

- The National NAMA Implementation Unit will be responsible for negotiating international support for NAMA implementation with international donors. If financial support is granted, the NAMA Implementation Unit will be the recipient and responsible for channeling resources to the implementers of the NAMA programmes, i.e., LPAs, Moldsilva, among others.

- The CCO of the MoEN has the mandate to promote and implement climate change related programmes and projects and will be responsible for communicating and reporting NAMA relevant activities at the international level, for example, to the UNFCCC.

- At the national level, a NAMA MRV framework is currently being developed. In the proposed framework, MoEN will have the overall responsibility for NAMAs and the MRV of NAMAs which includes a mandate

to prioritize, evaluate, approve/reject and monitor NAMAs.

- The NAMA Implementation Unit will closely cooperate with the NAMA Steering Committee in issues related to NAMA finance as well as development and implementation of NAMA activities. It will make sure that NAMA activities are implemented in line with the NAMA proposal.

Ministry of Agriculture and Food Industry, Ministry of Finance, Agency of Land Relations and Cadastre and the National Environmental Fund

- **Responsibilities:** NAMA advisory group

- The institutions will be closely linked to the National NAMA Implementation Unit and the Steering Committee and will provide advice during the NAMA implementation process where necessary, for example, on the setting of objectives and preparation of implementation plans in their respective fields of activity. The institutions will make sure that NAMA activities are in line with sectoral policies, programmes and projects.

Agency Moldsilva and its subordinate entities

- Moldsilva, its subordinate entities, i.e. SFEs, ICAS and NFCO, as well as other relevant organizations, for example NGOs, will implement the four NAMA programmes: Afforestation Programme, Capacity Building Programme, Market Development Programme, and financial mechanism. The setup of an organizational structure for carrying out NAMA implementation will be based on the structure that was designed for the implementation of the CDM projects on afforestation. It includes a Steering Committee led by a Chairman who is appointed by the Director General of Moldsilva.

- The Steering Committee will be guided by relevant legislation and Government decisions on afforestation, climate change and environmental protection. Relevant ministries can propose Committee members who will be appointed by the Director General of Moldsilva. The main tasks of the Committee are coordination, control and monitoring of the implementation of the NAMA programmes.

Communities

- Communities, along with their representatives, i.e. LPAs, will be involved in the implementation of the NAMA programmes. In the Afforestation programme, they will participate in the process of selecting degraded land for afforestation. The process starts with the examination of the issue of afforestation at local Councils meetings, the creation of Commissions for land selection, documentation of selected land for afforestation as well as participation in inventories of forest plantations. In the Market development programme, they will be involved in the selection of business cases and SME development.

7.2 NAMA Implementation schedule

As presented in chapter 5, the NAMA will be implemented in a phased approach consisting of three phases: Demonstration Phase (2016-2018), Scale-up phase (2019-2023) and Transformation Phase (2024-2030). Figure 10 shows an implementation schedule for activities to be carried out in each NAMA phase.

Figure 10. Implementation schedule of the NAMA

Measure	Phase 1			Phase 2					Phase 3						
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Afforestation programme															
Planning															
Implementation															
Monitoring															
Research															
Capacity building															
Establishment of demonstration sites															
Provision of trainings and workshops for different stakeholder groups															
Market development															
Market analysis															
Development of SME projects															
Set-up of a help-desk to promote SME development															
Awareness raising activities															
NAMA finance mechanism															
Finance of NAMA activities															

More detailed information on the Implementation schedule is presented in Annex 2.

8 MEASURING, REPORTING & VERIFICATION

8.1 Institutional framework for MRV of NAMAs

A national NAMA MRV framework is currently being developed by the Government and will be finalized in December 2016. The national MRV system that was developed for CDM projects, which serves as guidance for the set-up of the NAMA MRV scheme. The proposed institutional framework for the NAMA consists of MoEN, a National Commission, a Technical Committee and a MRV-NAMA Group (Pedersen, M. 2015) (Figure 11).

- **MoEN.** In the proposed scheme, MoEN will have the overall responsibility for NAMAs and the MRV of NAMAs which includes a mandate to prioritize, evaluate, approve/reject and monitor NAMAs.

  It is proposed that MoEN is the institution responsible to compile and evaluate MRV information at the national level. For that purpose, a national data management system will be established. MoEN can delegate part of the day to day administrative work to the MRV-NAMA Group.

  Moreover, MoEN will organize the NAMA verification process. A combination of different verifiers (First, Second and Third Party verifiers) will be considered to increase the quality of verification. Hence, a NAMA could be subject, for example, to First and Third Party verification. To ensure international and national credibility, it is proposed to use an international system of verifiers.

  The CCO of the MoEN has the mandate to promote and implement climate change related programmes and projects and will be responsible for communicating and reporting NAMA relevant activities at the international level, for example, to the UNFCCC.

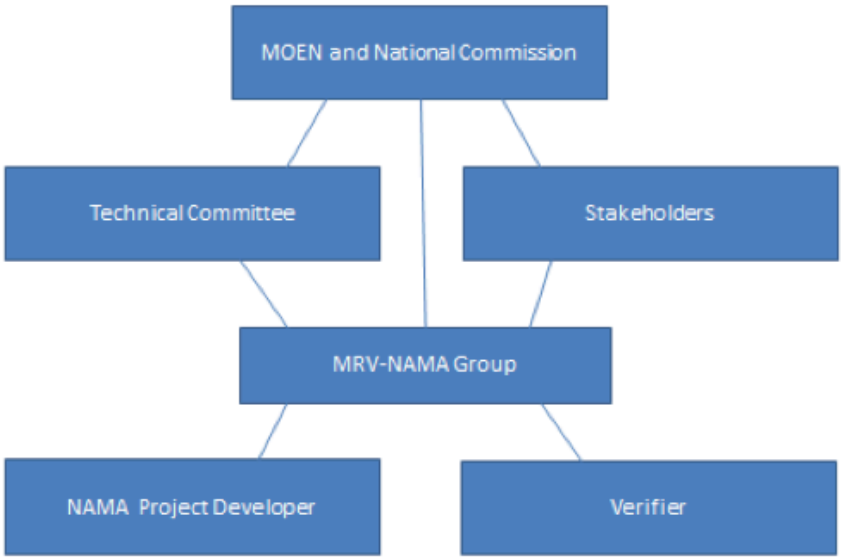
- **National Commission.** The "National Commission for Implementing Provisions of the UNFCCC and Provisions of the Kyoto Protocol" was established in 2003 (GD No. 1574 from 26.12.2003) with the mandate to communicate with the UNFCCC on CDM related matters, to evaluate CDM projects and to issue national Letters of Approval for CDM projects. The responsibility of the Commission will be extended to cover NAMAs.

- **Technical Committee.** 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 will have permanent experts which cover key aspects of a NAMAs related to: i) legal and administrative aspects, ii) policy and strategy, iii) financing, and iv) technical aspects and v) MRV.

  The Technical Committee will work based on the TOR and budget for each NAMA forwarded by the National Commission and it will prepare evaluation reports to the National Commission. Moreover, the Technical Committee, with support from the MRV-NAMA Group, will have informal consultations with NAMA Project Developers to clarify issues in the NAMA proposals.

- **Stakeholders.** Stakeholders are ministries and/or other institutions that have a role in the development and implementation of a NAMA. They will provide project developers with information that is needed to develop NAMA proposals and may support the MRV process if the NAMA is developed in their respective sectors.

Figure 11. Proposed institutional set-up for a NAMA MRV scheme



Source: Pedersen, M. (2015)

MRV NAMA Group. It is proposed to establish a MRV NAMA Group, which would have the specific function to support the MoEN with all activities related to the MRV of NAMAs, including data collection, processing and preparation of MRV reports. The Group is proposed to consist of 10-15 experts.

NAMA project developer. A NAMA project developer will be hired by MoEN to develop a NAMA proposal based on TOR provided by MoEN.

8.2 Measurement

8.2.1 GHG Emission reductions

The CDM methodology AR-AM0002 "Reforestation of degraded lands through afforestation/reforestation" (UNFCCC, 2009), which was used as guidance to determine the GHG emission reduction potential of the NAMA, can also be used as a starting point for developing a MRV methodology and for selecting MRV parameters. The CDM methodology should be reviewed and adapted where appropriate in order for the NAMA MRV system to be feasible.

The CDM methodology uses a stratified sampling design to estimate the verifiable changes in carbon stocks in the carbon pools considered in the project. The most important parameters to be measured in sample plots established within the framework of the NAMA are presented in Box 1. For a full list of parameters, see CDM methodology AR-AM0002 (UNFCCC, 2009).

Box 1 NAMA MRV parameters

Data / Parameter:	**Afforested area**
Data Unit:	hectares
Description:	Total area of all strata, e.g. the total project area
Monitoring frequency	At the start of the project and thereafter at monitoring intervals

Data / Parameter:	**Number of trees**
Data Unit:	dimensionless
Description:	Number of trees on plot, counted
Monitoring frequency	At monitoring intervals

Data / Parameter:	**Diameter at breast height (DBH)**
Data Unit:	cm
Description:	DBH refers to the tree diameter measured at 1.37 m above the ground.
Monitoring frequency	At monitoring intervals

Data / Parameter:	**Height of trees**
Data Unit:	meters
Description:	Height of trees measured on sample plot
Monitoring frequency	At monitoring intervals

Data / Parameter:	**Standing and lying deadwood in stratum i**
Data Unit:	Tonnes of carbon
Description:	Diameter of standing and lying deadwood are measured and recorded as part of sample plot measurement
Monitoring frequency	At monitoring intervals

Data / Parameter:	**Carbon in litter biomass for stratum I**
Data Unit:	Tonnes of carbon
Description:	Collection and weighting of litter on sample plots and subsequent laboratory analysis
Monitoring frequency	At monitoring intervals

Data / Parameter:	**Soil carbon**
Data Unit:	Tonnes of carbon
Description:	Sample plot measurement and laboratory analysis
Monitoring frequency	To be determined

Source: UNFCCC (2009)

8.2.2 Sustainable development

Data / Parameter:	**Economic benefits** a. Job creation b. Creation of SME
Data Unit:	a. Number of new jobs created through NAMA activities in afforestation, forest management, SME, etc. b. Number and type of SME created
Monitoring frequency:	To be determined

Data / Parameter:	**Social benefits** a. Gender equality b. Provision of forest resources c. Capacity building
Data Unit:	a. Number of woman and men employed in NAMA activities b. Percentage of demand for timber and firewood met with forest resources from NAMA afforestation sites c. Number of woman and men that received capacity building; amount of trainings received
Monitoring frequency:	To be determined

Data / Parameter:	**Environmental benefits** a. Ecosystem based adaptation b. Land restoration and protection of land from future degradation c. Biodiversity protection
Data Unit:	a. % of trees planted with a high adaptive capacity for climate change b. Number of ha of degraded land afforested and protection belts established c. Floral and avian species diversity in project sites relative to control sites
Monitoring frequency:	To be determined

8.2.3 Support

As mentioned in section 8.1, NAMAs will be monitored using standardized templates. In the case of the NAMA on Afforestation of Degraded Land, Riverside Areas and Protection Belts Restoring Degraded Land through Afforestation, beneficiaries of the NAMA will be required to periodically fill out the monitoring templates, which will have a section on support. Beneficiaries have to submit their templates to the CCO for processing.

Box 2 Proposed MRV indicators for support

Data / Parameter:	a. Financial support b. Capacity building support c. Technology transfer
Data Unit:	a. MDL/year and NAMA component/activity b. Number of trainings organized per year; number of people trained per year; number of training materials (type) received/distributed per year c. Number, type and value of technologies received per year
Monitoring frequency:	To be determined

8.3 Reporting

See section 8.1

8.4 Verification

The NAMA monitoring template will be approved by Government Decree, which is currently under development, and monitoring will therefore have the status of an official statistical census. According to the national legal framework, the provision of incorrect information is an illegal act. In addition to the data provided by beneficiaries, staff of CCO will be involved in NAMA monitoring on project sites, using mechanisms for cross-checking the information provided by project owners. In the establishment of this process, mechanisms established by the UNFCCC for preparation of national GHG inventory report will be considered. Practical and appropriate instruments for NAMA MRV will be developed within the framework of the UNDP LECB project and will be gradually implemented up to 2018.

9 RISK MANAGEMENT

As presented in different sections of this NAMA proposal, the Government of Moldova is in the process of setting up all elements of a framework that will enable the successful implementation of NAMAs in the country. Elements of this framework include policies and programmes that promote climate change mitigation, and establishment of targets for GHG emission reduction and afforestation as well as for sustainable development. Moreover, it includes an institutional framework that integrates all Government bodies that are needed to plan, finance, implement and monitor NAMAs. However, even with good planning and preparation of a robust enabling framework for NAMAs, the implementation of NAMAs, including the NAMA on Afforestation of Degraded Land, Riverside Areas and Protection Belts Restoring Degraded Land through Afforestation, may face some challenges and risks. Risks and proposed mitigation measures are presented in Table 14.

Table 14. Risk and mitigation measures

Risk factor	Proposed risk mitigation measure
Social	
Communities refuse to set aside land for afforestation	Experience from past projects, e.g. the CDM projects, demonstrates communities' interest and willingness to participate in afforestation activities. Moreover, the NAMA will provide incentives to communities for participating in afforestation, for example, by offering financial support for the establishment of forest-based SME.
High level of rural poverty and growing needs for forest resources will threaten newly established forests	The NAMA will create new jobs for rural communities, for example, in afforestation and forest management and through the establishment of SME. Moreover, in the design of afforestation projects, the need of rural communities for timber and firewood will be taken into account and a certain amount of hectares will be planted with forest species that provide these

Risk factor	Proposed risk mitigation measure
Capacity	
Limited human and technical capacity to design and implement afforestation projects	Moldsilva and its subordinate entities have extensive experience in afforestation of degraded land. Between 2002- 2010 alone, about 60 thousand hectares of new forests were established. Moreover, technical equipment and machinery have been purchased for soil preparation, planting and maintenance of forest plantations.
Limited capacity at LPA level in afforestation and forest management	Moldsilva and its subordinate entities have sufficient capacities to provide technical support to communities, which decide to participate in afforestation activities. In past afforestation projects on communal land, Moldsilva established forest plantations, managed and protected new plantations until canopy closure. At this point forests were returned to LPAs for further management. Within the framework of the NAMA, Moldsilva will carry out afforestation activities for communities and will, in addition, provide capacity building to communities to enhance their own capacities to engage in afforestation and forest management.
Limited capacity for the production of forest reproductive material for afforestation at a large scale	Moldsilva and subordinate entities have the technical capacity to produce approximately 50 million seedlings per year in their nurseries. With this amount, approximately 10,000 ha could be afforested annually, an area much bigger than the annual afforestation target for afforestation of the NAMA.
Environmental	
Natural disasters, e.g. droughts have a negative impact on tree growth	Moldsilva uses different strategies and technical approaches to protect forest plantations from climate risks. Moreover, Moldsilva will carry out research under the NAMA framework to develop new strategies that will allow forests to become more resilient to extreme weather events.
Financial	
Lack of international support for the implementation of the NAMA	Early involvement of potential donors in the NAMA planning process, including donors that already finance or have financed similar projects in the country. Preparation of a detailed, realistic and transparent NAMA finance plan. Promotion of the NAMA at the international level, for example, through its registration at the UNFCCC NAMA Registry.

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ANNEX 1

Outputs	Activities	Inputs (Technology, Capacity Building, Finance, Other)
Measure & intervention outcome – A: Afforestation programme		
A.1.1 61.500 ha of land selected for afforestation activities A.1.2 Forest management plans prepared for 61.500 ha of forest plantations	A.1 Planning	A.1.1 - Other: Commissions for land selection, information derived from the national Land Cadastre, visual appraisals; - Technology: use of GPS in the demarcation of project boundaries; - Finance: national public funds A.1.2 - Other: Information prepared under 1.1.1 (a) - Finance: national public funds, international grants
A.2.1 61.500 ha of land afforested by 2030 A.2.2 61.500 ha of afforested land managed in line with national forest management plans	A.2 Implementation	A.2.1 - Other: skilled staff to perform works related to land preparation, preparation of seedlings and planting; tree seedlings prepared; - Technology: Machinery for mechanical land preparations, tools for manual land preparation and planting; Finance: national public funds, international grants A.2.2 - Other: skilled staff to perform all activities necessary to enforce forest management plans - Technology: machinery (e.g. for thinnings and harvest) and tools (e.g. GPS, communications devices, computers) necessary to perform all tasks related to forest management including planning, harvest, protection and monitoring; - Finance: national public funds, international grants
A.3.1 Carbon sequestration and performance of trees under climate change monitored on a representative number of sample plots	A.3 Monitoring	A.3.1 - Other: skilled staff to perform all task related to determining the carbon sequestration potential of forest plantations; skilled staff to forecast and analyse the impact of climate change on forest plantations; experts in using tools to forecast impacts of climate change on forest ecosystems - Technology: Laboratories equipped to determine carbon content of wood, litter and soil samples taken from afforestation sites; models to forecast impacts of climate change on forest ecosystems - Finance: national public funds, international grants

Outputs	Activities	Inputs (Technology, Capacity Building, Finance, Other)
Measure & Intervention Outcome – B: Capacity building programme		
B.1.1 Demonstration sites available to demonstrate afforestation and sustainable forest and pasture management practices during trainings and workshops and to promote their large-scale implementation. Demonstration sites will be selected from previous projects where good results were achieved,	B.1 Establishment of demonstration sites	B.1.1 - Other: Best practice examples from previous and/or ongoing projects on topics related to afforestation, land restoration, forest and pasture management Finance: international grants
B.2.1 People from local communities trained to perform all task related to natural resource management activities relevant for the NAMA, including afforestation, forest management and pasture management B.2.2 People from local communities trained on relevant topics for forest-based SME development, including topics such as sustainable harvest practices, quality management of products, use of technologies for harvest and processing, marketing and sales strategies and financial planning	B.2 Trainings and workshops for different stakeholder groups	B.2.1 - Capacity building: Trainings and workshops with theoretical and practical training elements; - Finance: national public funds, international grants B.2.2: - Capacity building: trainings and workshops with theoretical and practical training elements - Finance: international grants
Measure & Intervention Outcome – C: Market development programme		
C.1.1 Forest products and services with the largest potential for forest-based SME development identified and different phases of market development supported by market analysis	C.1 Market analysis	C.1.1 Other: Staff skilled to perform market analysis on forest products and services Finance: International grants
C.2.1 Forest-based SME established, based on the most promising business cases selected during each phase of the NAMA	C.2 Development of SME	C.2.1 Other: Help desk (see C.3.1) with staff skilled to prepare business plans for forest-based SMEs, to support the preparation of applications for the revolving loan fund and the marketing of products Technology: Machinery (depending on the type of SME to be established) Finance: International grant to establish revolving loan fund
C.3.1 Help-desk available to support interested stakeholders with all issues relevant for the development, implementation and operation of forest-based SME	C.3 Set-up of a help-desk to promote SME development	C.3.1 Capacity building: Training for staff of the help-desk on relevant topics related to SME development Finance: International grant

ANNEX 2: DETAILED IMPLEMENTATION SCHEDULE

Measure	Phase 1									Phase 2																			
	2016	2017				2018				2019				2020				2021				2022				2023			
	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
Afforestation programme																													
Planning																													
1. Identification of sites for afforestation (degraded lands, forest protection belts for agricultural fields and water courses)																													
2. Organising of tender for carrying out of afforestation works																													
Implementation																													
1. Establishment of Baseline																													
2. Selection and contracting of entities for afforestation works																													
3. Signing of contracts between landowners and afforestation entities																													
4. Selection of species, design of planting projects																													
5. Selection and contracting of forest nursery for seedlings																													
6. Soil preparation																													
7. Planting																													
8. Tending activities																													
Monitoring																													
1. Monitoring of general performance of project																													
2. Monitoring of carbon																													
2.1. Tender and contracting of entity for performing of carbon measurements and development of monitoring report																													
2.2. Tender and contracting of laboratory for performing carbon analysis in biomass and soil																													
3. Creation of data base for project implementation																													
3.1. Tender and contracting entity/expert for developing of data base and it maintaining																													
Research																													
1. Organising tender and contracting of institution to perform research																													
1.1 Adaptive capacity of tree species and forest ecosystems on climate change																													
1.2. the impact of afforestation activities on land restoration and biodiversity protection																													
Capacity building																													
1. Provision of trainings and workshops for different stakeholder groups																													
1.1. Development of training programs for different stakeholders groups																													
1.2. Organization and holding of the project launching workshops (3 regional events)																													
1.3. Establishment of demonstration sites																													
2. Awareness raising activities																													
Market development																													
1. Market analysis																													
1.1. Organising of tender and contracting of an entity for performing analitical study on the market of forest and NWFP and services																													
1.2. Ferforming of analytical study																													
1.3. Development of short list of potential ideas of projects for SME creation																													
1.4. Announcement of the program for the development of pilot projects for forestry SME creation																													
1.5. Preparation of criteria for the eligibility of participation in the program																													
1.6. Selection of project proposals, signing contracts for grants																													
1.7. Development of pilot-SME projects																													
2. Set-up of a help-desk to promote SME development																													
2.1. Tender and conctracting experts for help-desk																													
2.2. Renderring consulting services for entities, individuals on SME development																													
3. Development of SME projects (based in different financial mecanisms: grants, revolving loan fund)																													
NAMA finance mechanism																													
Finance of NAMA activities																													

Measure	Phase 3																											
	2024				2025				2026				2027				2028				2029				2030			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
Afforestation programme																												
Planning																												
1. Identification of sites for afforestation (degraded lands, forest protection belts for agricultural fields and water courses)																												
2. Organising of tender for carrying out of afforestation works																												
Implementation																												
1. Establishment of Baseline																												
2. Selection and contracting of entities for afforestation works																												
3. Signing of contracts between landowners and afforestation entities																												
4. Selection of species, design of planting projects																												
5. Selection and contracting of forest nursery for seedlings																												
6. Soil preparation																												
7. Planting																												
8. Tending activities																												
Monitoring																												
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3. Creation of data base for project implementation																												
3.1. Tender and contracting entity/expert for developing of data base and it maintaining																												
Research																												
1. Organising tender and contracting of institution to perform research																												
1.1 Adaptive capacity of tree species and forest ecosystems on climate change																												
1.2. the impact of afforestation activities on land restoration and biodiversity protection																												
Capacity building																												
1. Provision of trainings and workshops for different stakeholder groups																												
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1.2. Organization and holding of the project launching workshops (3 regional events)																												
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Market development																												
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3. Development of SME projects (based in different financial mecanisms: grants, revolving loan fund)																												
NAMA finance mechanism																												
Finance of NAMA activities																												

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