Prepared for:
Environment and Climate Action Cluster, UNDP Uzbekistan

Feasibility Study on Designing a Masterplan on Afforestation in Uzbekistan

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20.1.2023

Content

Abbreviations

Abbreviation	
AFD	Agence Française de Développement

GGGI	Global Green Growth Institute
GIZ	Gesellschaft für Internationale Zusammenarbeit
ISCAD	International Strategic Center for Agri-Food Development
KPI	Key Performance Indicator
NTFP	Non-timber Forest Product
SCEEP	The State Committee on Ecology and Environment Protection of the Republic of Uzbekistan
SCF	State Committee on Forestry of the Republic of Uzbekistan
SFF	State Forest Fund

Notes

It is essential to point out that Yashil Makon's initial situation has changed during the period of preparation of this Feasibility Study. On the one hand, a new entity, the Natural Resource Ministry, was established, entrusted with implementing Yashil Makon. On the other hand, the scope of Yashil Makon has changed. While in September 2022, it was made clear that the program does not cover tree planting activities on State Forest Fund (SFF) land, this became indeterminate by the end of the study period. This feasibility study can only partially reflect on those changes.

1. Background and Scope

Desertification, water scarcity, human health threats, and heat waves are just some of the impacts on Uzbekistan caused by climate change. While forests and woodlands account for only 7.7% of the country's territory, they play a significant role in reversing desertification, protecting biodiversity, and for carbon storage. Parks and other green urban areas are valuable "green lunges" for city dwellers and take over essential functions in regulating urban temperatures.

To combat the negative impact posed by climate change on people and the environment, in November 2021, the Government of Uzbekistan introduced a tree-planting initiative called Yashil Makon (Green Nation). This nationwide program was added to the *Strategy for Developing the New Uzbekistan 2022-2026* and envisages the expansion of tree cover in the country by planting one billion trees in five years. To realize this ambition, the Government envisions the collaboration of multiple public agencies and the establishment of a Green Nation Fund.

To allow for a structured, efficient, and economic tree-planting campaign, a comprehensive **Master Plan** needs to be developed to guide the implementation phase. The envisioned Master plan aims to

- define priority locations for planting trees, shrubs, and grass
- define priority planting project types (planting schemes)
- define prioritized social and environmental co-benefits
- determine goals and measures of support for private sector initiatives
- integrate targets regarding improved irrigation and soil improvement
- establish a cost overview
- define competencies and responsibilities of project partners to ensure an efficient coordination system of Yashil Makon

In addition to the above-mentioned need for a Master Plan guiding the development of policies and administrative processes, an accompanying **Action Plan** needs to be elaborated that

- entails checklists for due diligence processes of planting sites
- entails checklists to accompany project planning processes
- serves as a decision-making tool regarding suitable tree species and planting schemes
- sets guidelines for a tree inventory and monitoring system

The following feasibility study was prepared to explore the a) readiness to establish a **Master Plan** for Yashil Makon on the government level and b) identify gaps in preparation for a tree planting campaign on the operational level that can be closed by an **Action Plan.**

Please also consider the annexes to this study:

Annex 1: Stakeholder analysis

Annex 2: Planting schemes[1]

Annex 3: Governance scheme, inventory and monitoring , cost estimation

The Feasibility Study does not include an analysis of the legal framework for Yashil Makon.

2. Yahil Makon Governance

The following chapter assesses the mandates, priorities, challenges, and needs of Yashil Makon stakeholders. It also shows their interest and influence in developing and implementing a Master Plan. For the profiles of the individual stakeholders, please refer to Annex 1 (chapters 2.1-2.4).

2.1 Stakeholder influence and interest in Master Plan development and implementation

The prioritization matrix below (see Figure 1) sorts the Yashil Makon stakeholders and some additional entities into four different categories.[2] The first category, "*Manage closely,*" contains highly influential stakeholders that are at the same time intringsingly interested in the success of Yashil Makon. This group includes only state entities, with the *State Committee of the Republic of Uzbekistan on Ecology and Environmental Protection* (SCEEP) being the strongest member of this group. SCEEP is a committee of the *Natural Resource Ministry* and responsible for Yashil Makon's overall implementation. The *Ministry for the Support of the Mahalla and the Older Generation* - seeing the potential for economic growth and well-being for community members in the program - is an entity that may act as an important strategic ally. On the sub-national level, the forest enterprises (Leskhoz), the local etities of the Committee for Roads, and the city and district administrations are essential stakeholders for

[2] The matrix shows, in addition, the Ministry of Finance, the city/district administration as well as the Road Committee. No meetings took place with those entities.

successful practical implementation. Their participation is crucial for developing site-adapted planting designs, the insurance of low mortality rates due to proper management, and cost-effectiveness.

The State Committee on Forestry (SCF) is, through its responsibility for Leskhozes, indirectly responsible for the delivery of the majority of planting material, transport of seedlings, and tree plantings. However, as Yashil Makon is not implemented on State Forestry Fund land (status of September 2022) and due to the fact that SCF perceives itself to be seen as a Yashil Makon service provider for SCEEP, the intrinsic motivation to support the program is not at its maximum. This is reinforced as SCF believes SCEEP lacks the necessary forestry knowledge to design a sound afforestation program. Furthermore, SCF highlights the necessity to prepare the foundations of a modern forestry sector (e.g., forest inventory, digital maps on land use and land use change, and forest monitoring). Before starting a massive afforestation campaign, those foundations must be implemented as the backbone for economically viable and healthy forests with social and ecological co-benefits.

The second category, "*Keep Satisfied*," contains stakeholders that can drastically influence the program's success. That group includes the Ministry of Finance and the two entities administering the use of above and below ground water. It became evident in the consultations that the organizations can only decide on the allocation of resources (financial budget and water) with a clear Master and Action Plan. For the Ministry of Finance, the Master Plan must contain costs and returns broken down by year. For the entities responsible for water use, the water demand by region and year is the indicator that will allow them to agree or disagree with the program.

Regular consultations with this group during the development of the Master Plan are critical to determine whether the envisioned program is acceptable. This way, program components that will not be accepted can be ruled out before detailed planning starts. Long-term master planning (min 10 years) should be assured to realistically represent financial cost, return, and water demand. To guarantee the long-term success of Yashil Makon, the need for financial support and secure water access for at least a decade should be outlined in the agreements with the Ministry of Finance and the entities responsible for water allocation. Shorter periods contradict the nature of afforestation programs.

The Zamin foundation, the private wood sector, the forestry research institute, and the International Strategic Center for Agri-Food Development (ISCAD) belong two the "*Keep Informed*" category of stakeholders that ought to be updated about new strategies and project plans of Yashil Makon. Those stakeholders may use the opportunity to adapt their activities according to Yahil Makon, given that

they are informed about developments well in advance (Zamin, private forest/wood sector). They may also share practical recommendations for implementation (Forest Research Institute) or point out lines of conflict at an early stage (ISCAD).

The last category is entitled "*Monitor* ."In this study, the stakeholders to be monitored are development partners such as AFD, GGGI, or GIZ. All those organizations worked on afforestation, agroforestry, or improved pasture management projects in Uzbekistan (it was not possible to speak with all development partners working in those fields, there are potentially other experienced partners who are not mentioned here).

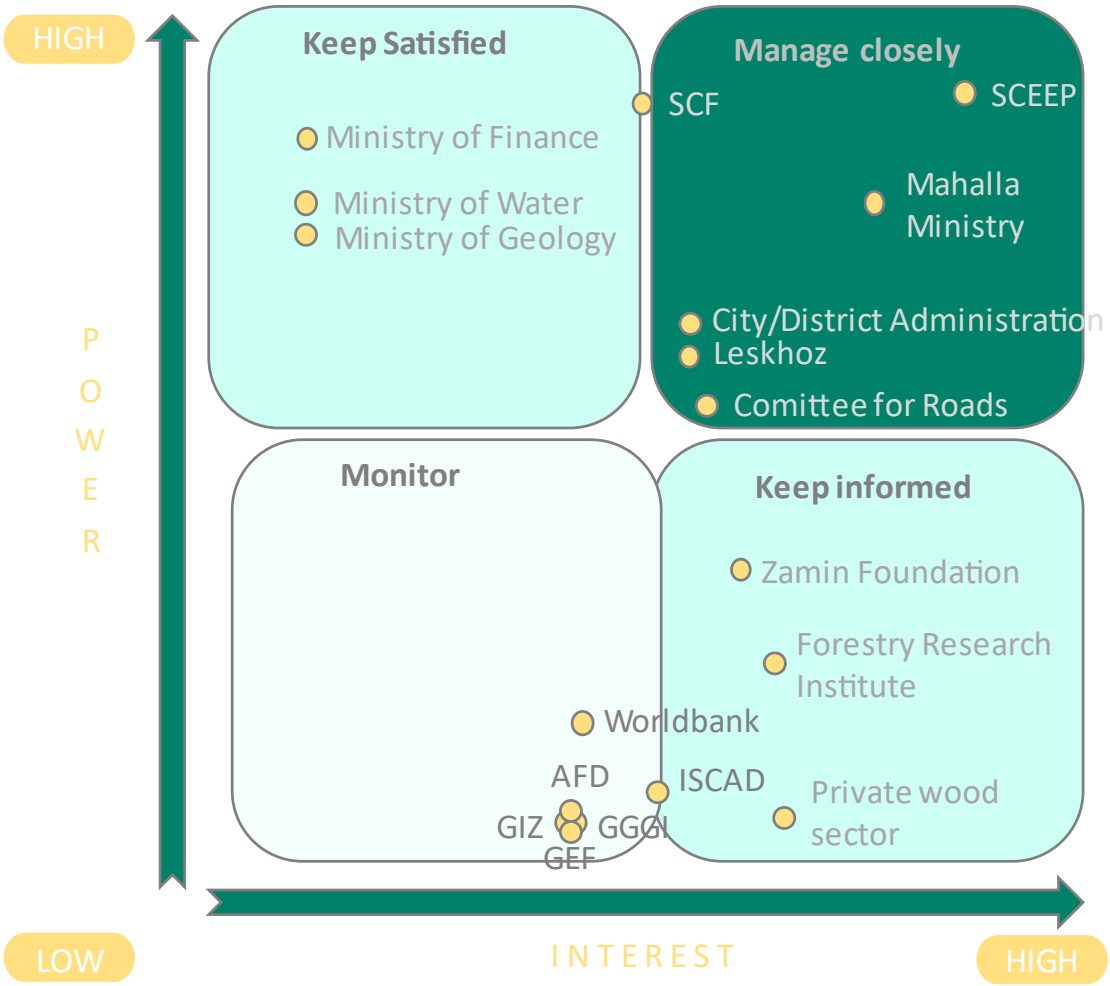


Figure 1: Matrix showing the level of influence stakeholders can take on Yashil Makon and their level of interest in the successful implementation of the project

Those organizations have detailed records of lessons learned from pilot projects and conducted/are currently conducting feasibility studies on planting schemes in their priority areas. All organizations are willing to share knowledge. It is noticeable that all the implemented pilot projects have an

economic component. Should economic forestry schemes be considered within Yashil Makon, the international institutions would be good sparring partners for knowledge exchange. To incentivize international partners to get more involved in Yashil Makon, additional information needs to be shared on the scope of the Green Nation program. At this time, some international stakeholders are unsure about the kind of planting activities that can be accounted towards Yashil Makon, if already planned/started projects will be part of it, and if projects on SFF lands are generally excluded.

For all four groups described above, developing an approach on how and in which frequency stakeholders' involvement will occur is helpful.

2.2 Governance-related risks and barriers for Master Plan preparation and implementation

The consultations with the Yashil Makon stakeholders made evident that a Master Plan is crucial for setting up a governance mechanism ensuring cost efficiency, avoidance of land conflicts, low tree mortality rates, and social, environmental as well as economic co-benefits. The following points show the shortcomings on governance level that a Master Plan may help to address:

Secured resource allocation

The need for a clear governance structure becomes unmistakably clear when considering the irrigation and financing needs of Yashil Makon. The successful implementation of the program is inevitably linked to the provision of sufficient water and monetary resources over a minimum of ten years. The possible implications for other sectors through the allocation of money/water to Yashil Makon should be discussed and agreed on with all responsible ministries. This room for exchange and discussion needs to be included in a governance scheme.

Unclear area of implementation of Yashil Makon

At the time of preparing the stakeholder analysis, it was communicated that Yashil Makon is not implemented on SFF land. Therefore, Leskhozes understood the program sometimes as a burden as it comes with additional workload while the implementation takes place on sites outside their responsibility. Beginning of 2023, it was communicated that Yashil Makon may indeed be implemented on SFF land. That changes the role of Leskhozes. To be able to define the roles of different stakeholders, it is necessary to determine the possible implementation areas of Yashil Makon.

Avoidance of land conflicts

Planting activities for Yashil Makon have been taking place on agricultural land. As a result, the land available for wheat, cotton, or other crops is decreasing. To avoid land use conflicts, to develop concepts for alternative income generation in the agricultural sector (e.g., agroforestry concepts, wood production), and to account for possibly not fulfilled production targets for cotton and wheat, agricultural stakeholders should be involved on normative level in the Master Plan development.

Economic forestry

Given that an economic forestry component - as prioritized by several stakeholders to create incentives for sustainable tree management - is included in the Yashil Makon Strategy, several legislative changes have to be made. To make sure to base proposals for legislative change in line with the needs of the majority of the critical stakeholders, structured involvement of all involved ministries and committees is recommended.

2.3 Recommended Governance mechanism for Master Plan Development and Implementation

Steering system on political-normative, strategic, and operational level

To ensure practicability, effective resource use and to oppose the tensions between SCEEP and SCF, it is recommended that representatives of all entities mentioned within the “Manage closely” group are actively involved in developing the Master Plan and Action Plan for Yashil Makon. That should also include local representatives from, e.g., Leskhozes to make sure that a) lessons-learned from the first planting seasons are integrated, b) their experience regarding planting site due diligence and project planning is taken into account, and c) make sure to set guidelines for the creation of co-benefits that respect the local knowledge about priorities and needs of communities. Different operational, strategic, or normative essential decisions must be prepared and conducted systemically. Implementing an efficient steering system is a prerequisite to facilitating collaborative decision-making. Through a transparent steering system, the following is clarified:

- Procedures for how decisions are reached
- Responsibilities and roles of each cooperation partner

The tasks of the Yashil Makon steering system are proposed to be defined in the Master Plan as the following:

- Setting of overall and specific goals (including the definition of strategic environmental and socio-economic goals)

- Securing the funding and setting a budget;
- Introduction and reflection on different strategic options (including thoughts on intensifying the incorporation of the private sector through legislative changes, such as the reversal of the currently existing logging ban or reflections on the potential role of natural regeneration through improved pasture management to reduce grazing pressure)
- Taking normative, strategic, and operational decisions;
- Recognition and resolution of conflicts;
- Resource management
- Operations planning (establishment of a multi-year strategic project plan for Yashil Makon at national and regional levels defining priorities for afforestation, reforestation, and other planting activities. The plan should include an assessment of the current situation, risks, and an overview of implemented successful and unsuccessful planting projects.
- Planning of a monitoring system (establishment of a set of key performance indicators for Yashil Makon planting activities measuring species distribution, growth, survival rate, and socio-economic factors in addition to numbers of trees planted)
- Implementation of a comprehensive tree/forestry inventory system based on an information needs assessment to support decision-making, policy development, and monitoring;
- Establishments of definitions for words such as "regreening," "revegetation," and other terms crucial in the Yashil Makon context need to be established for uniform application and elimination of different interpretations of terms.

It is common to assign different groups for
a) the political and normative steering,
b) the strategic steering and the
c) operational steering
This differentiation relieves high-ranking decision-makers from decisions that are made in a more informed manner by regional or technical experts. It also ensures greater acceptance of the control structure among the stakeholders involved. It is important to ensure that the different steering groups are formed within the established governmental settings to avoid the formation of additional structures.

Figure 2 shows which level is mainly responsible for which task of the steering system. Whereas the political and normative steering dedicates itself to setting the goal, elaborating a funding mechanism, and managing the possibly contradicting views of stakeholders (conflict management), the strategic steering develops the overarching implementing strategy of the program based on the defined goal

and the available funding. It also plans and coordinates the overall program implementation and controls its progress. However, the strategic steering group does not plan and coordinate single planting projects. Those tasks are handled on an operational level through an individual project coordinator or a coordinating team.

Some mentioned tasks can be fulfilled on different steering levels. Coordination, for example, may happen on strategic and operational levels. However, the scope is different: Individual project coordination occurs on the operational level, while the strategic level oversees overall program coordination.

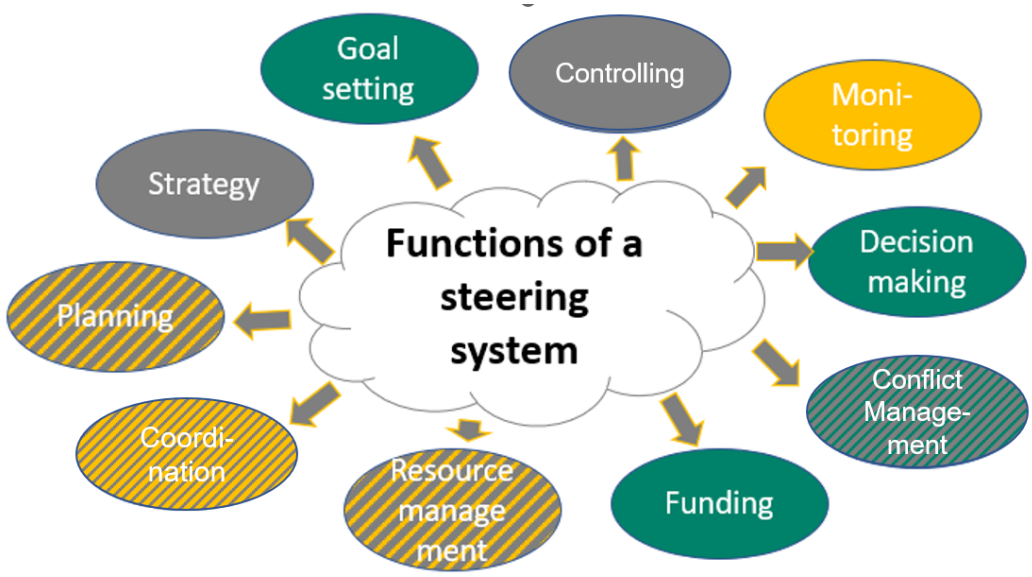


Figure 2: Functions of a steering system differentiated by steering level (green = normative/political level; grey = strategic level, yellow = operational level; functions with a striped background are conducted by two levels). The division is not all-encompassing. Decision-making and conflict management, for example, occur on all levels, depending on the scope.

The different steering levels are in continuous exchange as the political-normative level sets the framework for strategic steering. The latter gives management tasks to the operational steering. The operational steering provides the strategic steering with monitoring data and feedback. Feedback, monitoring data, and difficulties to be resolved on the political-normative steering level are passed back there from the strategic steering.

Yashil Makon steering system

A possible setup for a steering system within the framework of Yashil Makon is shown in Figure 3. During the development of the Master Plan, it is recommended to refine the proposed system, verify its functionality with key stakeholders and adapt it in accordance with stakeholder needs.

The political and normative level may consist of a group of decision-makers from the involved ministries and committees, such as the Water Ministry, Finance Ministry, Agriculture Ministry, Mahalla Ministry, and SFC and SCEEEP. This group should be chaired by an experienced moderator without conflicts of interest. Regular meetings of this group are advisable to account for necessary adaptations of the program based on the results of controlling and monitoring on strategic and operational levels. An advisory council of scientists, NGOs or international organizations' representatives may support the political and normative steering group. It can be consulted to ensure that decisions are set in accordance with science and international/national best practices.

Stakeholder consultations showed that the degree of involvement of different ministries in Yashil Makon depends on the type of planting activity. The Mahalla Ministry, for instance, is more involved if plantings take place on the land of rural Mahallas or are undertaken with the help of local communities in cities. If roadside plantings or belt creations on agricultural land are targeted, Mahalla involvement is less crucial. The detailed setup of the governance system should reflect on the level of involvement based on prioritized planting schemes. To specify which organizations are supposed to participate in the steering committee and the advisory council, it is necessary to have identified priority areas and planting concepts. Participation on normative level also opens doors for stakeholders to integrate their priorities into Yashil Makon activities. In the case of the Water Ministry, that is, e.g., the implementation of innovative water-saving irrigation technologies and the digitalization of water use monitoring.

On the strategic level, a Yashil Makon coordination office and secretary under the roof of the Natural Resource Ministry may be established. Representatives from the operational units of ministries and experts from civil organizations are well qualified to implement the tasks of that office. In order to fulfill the day-to-day business concerning controlling or resource management, units can be spun off, taking over those functions.

Coordinators or coordinating teams of individual planting projects are steering on operational level. They are responsible for project implementation following the goals, framework, and processes defined by the upper levels. They will pass monitoring data to the strategic level, which will be analyzed and compared there with the data of other planting projects. During the process of Master Plan development, it is recommended to develop in a participatory process the scope, goals, necessary funds, and timeline for the work of the coordination office.

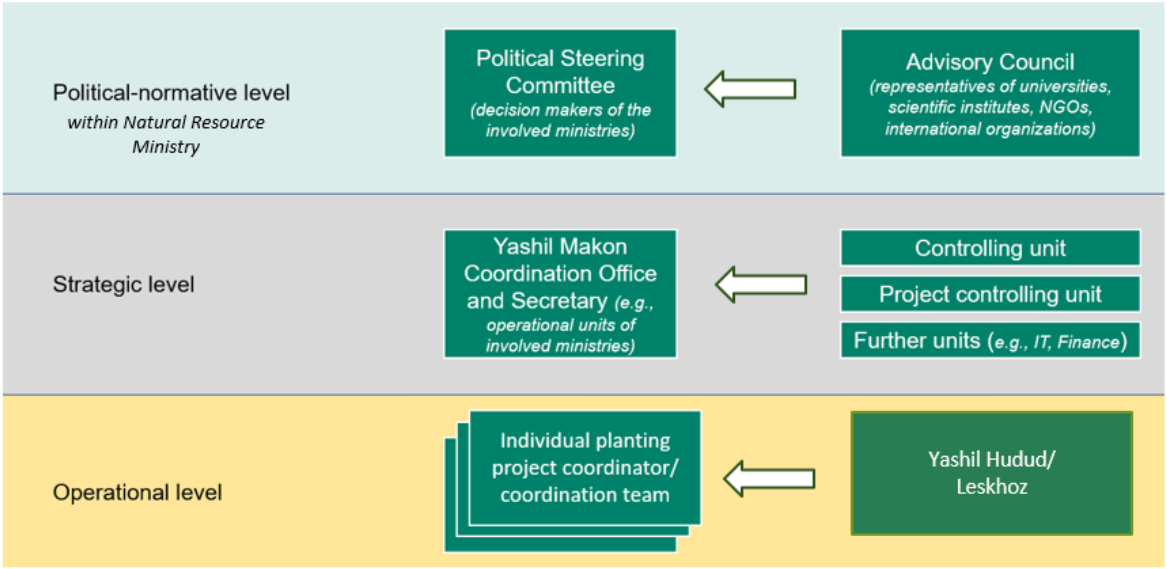


Figure 3: Proposed Yashil Makon Steering system divided by political-normative, strategic, and operational steering level

For more information on the steering mechanism, please refer to (Annex 3).

3. Yashil Makon Management modalities and processes

The graphic below (Figure 4) shows the current decision-making process when a new planting project is scouted. Even though planting proposals are reviewed by district and regional level administration, the final decision is taken on a national level.

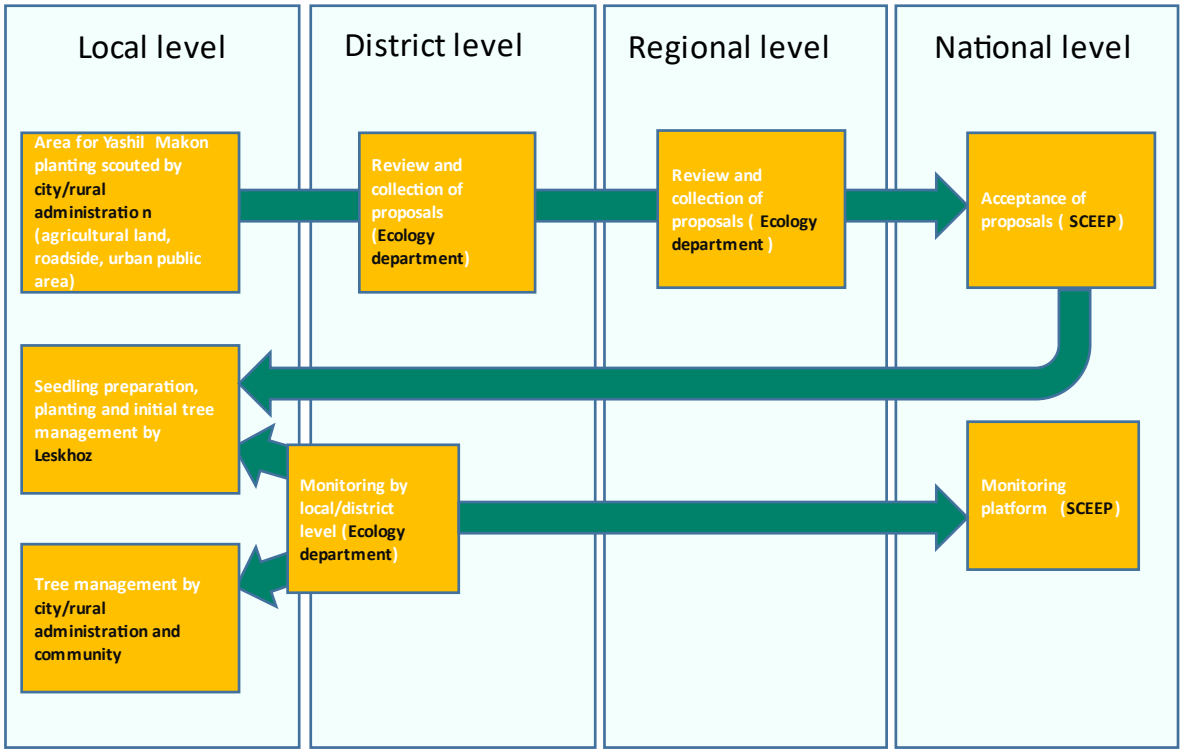


Figure 4: Decision-making and monitoring workflow after scouting a potential Yashil Makon area. The scouting process lacks proper due diligence and comprehensive project planning.[3]

3.1 Barriers and risks related to current management modalities and processes

The current decision-making on selecting project sites, planting designs, and tree species is very centralized, with SCEEP responsible for making final decisions on project proposals. To

a) reduce the workload of SCEEP,

b) increase accountability of local level stakeholders, and

c) ensure the best possible involvement of local expertise,

it is recommended that final decisions concerning individual planting activities within Yashil Makon are made on a strategic level by the Yashil Makon Coordination Office and Secretary (compare Figure

[3] The flowchart was developed before the foundation of the Natural Resource Ministry. Adaptations depending on the structure and processes of the new institution are likely.

3). To ensure that those decisions support the overall strategy, overarching key performance indicators (KPIs) may be developed through the project controlling unit of the secretary that goes beyond the number of trees planted. Please compare Output 2 Chapter 4 for more recommendations regarding monitoring.

3.2 Recommended management modalities and processes for Yashil Makon

It is advised to establish Yashil Makon management structures on two levels: The operational and the strategic. To ensure efficient workflows, it is recommended to define those two levels in detail in the master plan to specify interfaces and boundaries. Suggestions for which scopes the two levels are responsible for are given below:

3.3 Operational level management modalities

On operational level, the due diligence for planting areas, as well as the planning and implementation of individual plantings may take place under the lead of Yashil Hudud (local entities established under the State Committee of Forestry). Evidently, it has often been rushed - without comprehensive planning – into the implementation of planting activities, and project designs are commonly not adapted to local ecological conditions and stakeholder needs. To increase the rate of successfully completed projects, the five steps of a project cycle may be defined in the Master Plan:

1. Site selection according to goals, priorities, and targets defined on national level
2. Visioning
3. Planning project activities
4. Project implementation
5. Monitoring and evaluation.

Detailed concepts and checklists for each step may be specified in the accompanying Action Plan. The following due diligence activities belong to the first step:

1. Mapping of the planting area and neighboring land, including water resources and infrastructure (access to planting area)
2. Performance of a soil analysis to be informed about salinity and other soil parameters
3. Identification and mapping of stakeholders and their assumed needs and interests

The step “Visioning” contains the following tasks for project coordinators:

1. Establishment of a platform where multiple stakeholders, especially vulnerable groups like minorities, women, children, and people with low incomes, can present their concerns and their wishes (species selection, NTFP, opportunities for participation/income generation, etc.) regarding the planned project
2. Develop solutions for raised concerns and verify if they are resolved

“Planning project activities” contains the following steps:

1. Discussion of different kinds of afforestation schemes/planting designs considering soil conditions, site-adapted tree species, benefits for the local population and select the most suitable one
2. Development of a project management plan based on the outcomes of the previous points
3. Development of a multi-year timeline
4. Development of a multi-year cost plan for the project
5. Assessment of water needs and design of an irrigation plan
6. Design of a monitoring system (see Output 2, chapter 4, for more information on monitoring)
7. Discussion of roles and responsibilities of each stakeholder

“Project implementation” is built up around the following steps

1. Order of planting material - as early as possible
2. Organization of equipment for project implementation
3. Engagement of local population

For more information on monitoring, please see Annex 3. Please see the list “Checklist for Planning and Implementing Planting Activities” (Annex 2, Chapter 5) for information on project planning.

Decision-making processes on operational level

A project may not be implemented if - during the processes of due diligence (step one and two) and project planning (step three) - it is not seen as feasible due to one of the following reasons:

- The project does not match the goals and priorities of Yashil Makon
- Site conditions are not suitable for tree planting
- Stakeholders are harmed/oppose the planting
- Project design exceeds project budget.

The graphic below shows a decision tree guiding whether to implement a project. It also shows the interaction between the operational and strategic steering level (Yashil Makon Coordination Office and Secretary), whereas the latter approves the project documents and the cost plan. There is a need to define indicators (in the framework of the Action Plan) that create transparency and ensure that the best potential projects are selected.

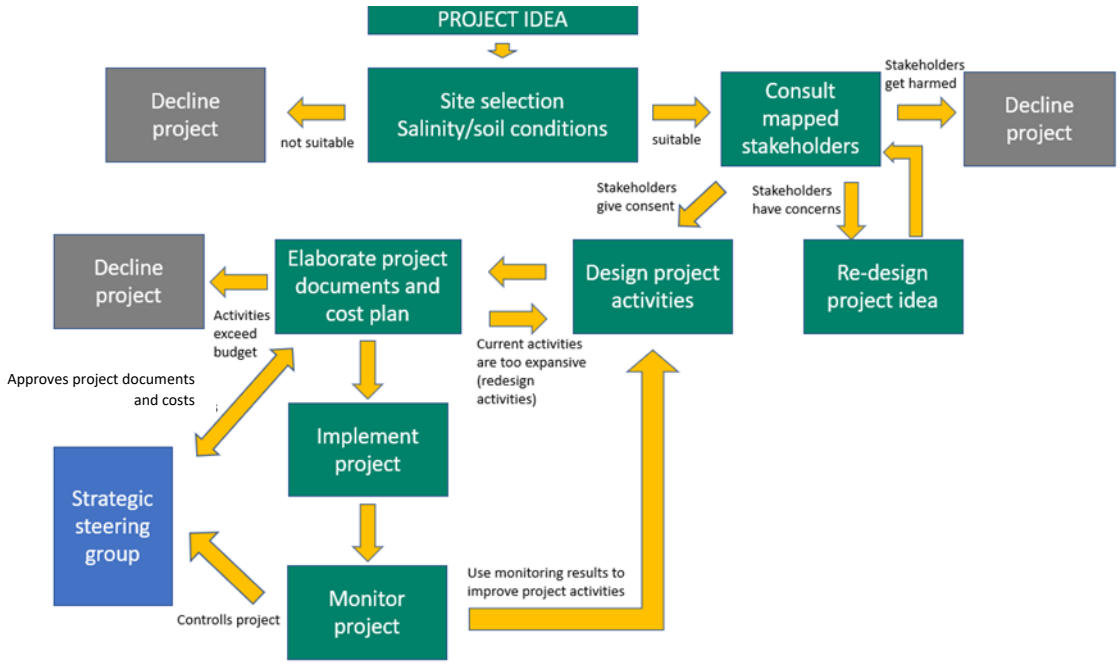


Figure 4: Decision tree showing possible reasons to decline a project and loops for re-designing the project idea and activities. It also shows when approval through the strategic steering level takes place.

Management on strategic level

The strategic steering level management is involved in the aspects described below while ensuring cohesiveness and compliance with the national targets and priorities at the local level. It is recommended to further specify the management competencies with the relevant stakeholders in the context of Master Plan development while avoiding to duplicate responsibilities with management competencies on an operational level.

1. Initiating projects

The first task is to initiate projects that meet the normative requirements, which are supported by the local population, and that are within the budget. This can be done through direct consultation with the Yashil Hudud, Leskhozes and other implementing bodies, but also through creating incentive systems (e.g., financial incentives for farmers who create

windbreaks or agroforestry areas). Also an open call to districts to submit planting project ideas is possible.

2. Project and resource approval

If projects are proposed, their project documents (management, irrigation, and monitoring plan, division of responsibilities, timeline, and cost plan) are evaluated according to established indicators. The indicators are based on the inputs of the political-normative steering group. A project may adjust the activities if it doesn't meet the minimum requirements. Can a project still not comply, it may be declined.

3. Controlling (financial, project goals)

Based on the monitoring data and costs communicated by the operational level, comparative controlling is done between the individual projects. It is intervened and advised when projects underperform or have unreasonable costs.

4. General Focal point

The steering committee advises in case questions arise on operational level, helps to resolve conflicts that arise between different stakeholders, and develops resources that can be used by various projects (monitoring guides, software solutions, etc.) It also oversees the communication of results to the general public.

Management on political and normative levels

The political and normative steering group sets the framework for the work on the strategic and operational levels. Within that group – next to the planting goal of one billion trees – sub-goals are set which are integrated in the Master Plan. They may cover topics such as:

- Enhancement of biodiversity (in rural and urban areas)
- Environmental connectivity
- Creation of recreational space
- Economic development
- Reduction of heat islands

Also, specific performance indicators such as acceptable mortality rates (differentiated by ecosystem) and tree vitality might be decided on within this group. Priority planting areas and

priority planting schemes (compare Output 2) will also be defined by this group and possibly revised based on monitoring results.

Additionally, this group needs to set up an overall project budget and financing mechanism.

It is recommended that the group meets regularly to react to feedback from the coordination secretary (strategic level) that may make adjustments on the policy/normative level necessary.

The normative and political steering group may also push for legislative changes in the scope of Yashil Makon to make the program even more successful or environmentally friendly. Examples of legislative changes may be the integration of natural regeneration within the scope of Yashil Makon or the acceptance of an economic pillar facilitating industrial wood production.

4. Planting Mechanism

The following chapter summarizes Outcome 2 and discusses its implication for implementing Yashil Makon[4]. The following aspects are in focus:

- Possible improvement of planting schemes currently used in Yashil Makon
- Suggestions for new planting schemes to be included in the Master Plan.
- Statements to what proportion these schemes may be used within Yashil Makon
- Policy and practical recommendations derived from the visited planting projects

4.1 Improvement of currently used planting schemes

City greening: Urban recreation (parks, urban forestry)

The assessment of the implemented city greening activities has shown that community involvement is only marginally occurring. However, public involvement in the first phase of park planning is crucial. The community will identify strengths and weaknesses in proposed plans and voice their approval and criticism. The ideas provided by the community regarding

[4] The descriptions of currently used planting schemes are based on visited sites in Tashkent, Sukhandaria, and Karakalpakstan. Other project types were not visited in practice.

city greening might influence the basic concepts of future planning. It is advisable to develop in the Action Plan a participatory process of creating urban green spaces.

In addition to residents, other stakeholders such as conservation organizations, senior citizens' associations, or local sports clubs could also be involved in this phase.

Tree species selection

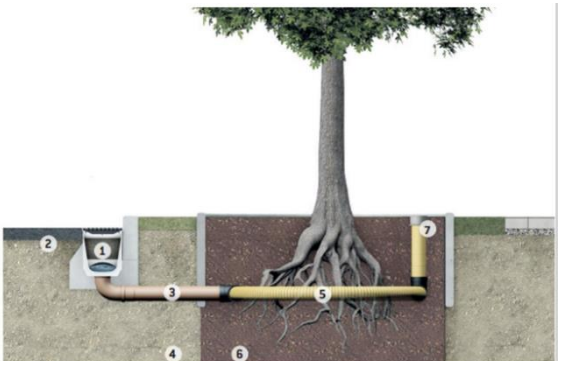
The water consumption of many parks in Uzbekistan is extremly high due to unfitting tree species choice. When selecting tree species, it is recommended to select species adapted to the region's new climate reality and to prepare for a more water-scarce future. It is recommended to add a guide for selecting climate-adapted tree species for every region in the Action Plan.

Picture 1: Examples of insufficient irrigation in the center of Tashkent (Amir Timur Avenue), v. Puttkamer 2022

In the first phase of the Yashil Makon (2021-2022) initiative, thousands of new trees were planted between major trees, not respecting their space requirements. It is recommended that the Action Plan includes a decision-making tool that helps workers to carry out plantings in a site-appropriate way based on the detailed overview of planting deficits provided in Annex 2.

Irrigation in parks

For the time being, the planners of green spaces do not consider water scarcity a significant problem in Uzbekistan. This is surprising, given that the Uzbek water authority speaks of a consumption of currently 170 % of the annual water supply and a continuous decline of the groundwater level.



Picture 2: Smart Urban Tree irrigation: Water – Soil – Plant Irrigation. Presentation by Toth Csaba 2022

Many of the existing irrigation systems are outdated and inefficient. Due to excessive irrigation, the water cannot seep deeply into the ground but tends to flow directly onto the

streets or sidewalks. The plants are often watered in the middle of the day (i.e., during the most significant heat between 11:00 a.m. and 4:00 p.m.). This leads to strong evaporation.

As it is usually cooler and evaporation is lower in the early mornings or nighttime, a change towards watering the plants in the night /early morning could save 10-15 % of the utilized water. The Action Plan may provide checklists for irrigation design and planning, and a set of "smart irrigation"-KPIs.

Applying mulch also significantly reduces the evaporation of water in the topsoil and counteracts the increase of salt content through transpiration. It is also advisable to describe the usage of biochar or hydrogel as a soil additive in the planting process. These materials have the ability to attract and retain water and nutrients and are currently not used in the planting processes of the country.

New planting techniques

In recent years, science has increasingly focused on planting trees in urban environments. Currently, there are several newly developed planting methods considering urban water scarcity. Planning schemes such as the Stockholm or Milwaukee methods were discussed during the field trips in Budapest. It is recommended to assess these methods and their possible application in Uzbekistan and, if reasonable, include them in the Action Plan.

Picture 3: Stockholm method https://stockholmtreepits.co.uk/

Park management/inspections

The Action Plan could provide a checklist for regularly inspecting (e.g., biannually) trees and shrubs in parks, green spaces, and along streets. It is recommended to advise personnel on how to recognize diseases and check rotten branches or tree damage that could pose a risk to passers-by and traffic. To be able to carry out this task professionally and without time loss, an exact cadaster of its green spaces, including the location of all major trees, is a prerequisite. For this (see Annex 3), an inventory and a management plan must be developed.

Roadside planting: Main roads around towns and cities

Roadside plantings were carried out professionally. Nevertheless, the selection of tree species is questionable. It is advisable to focus on native, drought-tolerant plants to the greatest extent possible; those are preferred over exotic plants primarily chosen for their aesthetics.

A selection tool guiding species choice, considering climate conditions, soil salinity, and water availability may be included in the Action Plan. Particularly in non-urban dry areas where irrigation is more challenging to secure and to monitor, drought-tolerant species such as Saxaul, Russian Olive, and Mulberry are preferable. The branches of mulberries and other trees with a high coppice capacity can be used as a mulch layer. Mulch layers improve the soil in the long term and protect the ground from drying out.

Roadside tree planting adjacent to agricultural areas needs to be designed in consultation with local communities and farmers to ensure that local preferences in regard to tree species selection are taken into account. If fruit and nut trees are chosen, the harvest may serve as additional income for farmers or as a food source for local communities. If co-benefits are generated for local users, the planting project's acceptance and the community's caretaking of the trees will likely be enhanced.

In all visited roadside plantings, the planting patterns were too narrow. The general rule of thumb for row plantings is to space larger trees at 4-6 m apart, larger shrubs at 1-2 m apart, and smaller shrubs at 0.5-1 m apart.

Native drought-resistant grasses and shrubs that spread themselves may be introduced as understory of roadside plantations to support the natural regeneration of surrounding areas. That way, street planting can serve as a starting point for natural succession in adjacent non-forested areas.

All roads with adjacent space free from utility lines or drainage pipes are suitable for planting trees. If trees with heavy fruits/nuts or with fruits that become mushy-slippery when driven over them are selected as roadside plantings, the accident risk for pedestrians and motorists (depending on usage intensity and speeds on the street) needs to be assessed before final species selection.

Agroforestry green belts/green belts

Green belts are successful and integral parts of the green nation initiative. Examples of successful green belts and possible variations are described in Annex 2. Creating green belts helps produce agricultural and (non-)timber forest products and establish wind protection for the downwind side. As in other planting initiatives already mentioned, it is advisable to involve local farmers in the decision-making on green belt structures.

Currently, there is no legislative framework for the management of green belts. For example, farmers are currently not allowed to prune tree rows. It is therefore recommended to develop a legally accepted management concept for the green belts in the Action Plan. Belt sites should be within walking distance from local subsistence farmers to ensure their interest in managing the agricultural area between rows.

It was observed that many tree species used in the green belts were partly unfitting in the saline soils of the area (the soil quality and salinity differed mosaic-like). This highlights the importance of extensive soil sampling in the planning phase of a project). It is advisable to use mobile ground salt measuring equipment for this purpose and to include its use in the mast plan.

4.2 Suggestions for new planting schemes

Agroforestry systems

Agroforestry systems have the potential to make a significant contribution to the Yashil Makon initiative.

Agroforestry is a land-management practice that substantially contributes to climate change mitigation without compromising food supply. The government could save significant management costs by involving local farmers in the green nation program by introducing agroforestry systems on the fields surrounding cities, towns, and rural settlements. Besides reducing Yashil Makon expenses, this new planting scheme would strengthen the private sector and give the farmers a valuable byproduct (such as timber for construction and firewood).

The choice of trees may depend strongly on the region's climatic conditions, soil composition, and water availability. Fruit/nut plantations can be established, but also plantations for construction timber or firewood. Since private people in many parts of Uzbekistan traditionally plant poplars in backyard agroforestry systems, it is (if using poplar species) recommended to provide them with more productive hybrids. In addition, respective capacity-building on how to manage and breed these hybrids is necessary. It is advisable to select local crossbreeds for this.

The planting distance within the tree rows must be chosen according to the requirements for healthy crown development and to avoid crop failure due to excessive shading.[5] The microclimate created by the trees may promote the development of intercropped plants.

Agroforestry systems can be established on nearly all agricultural land. However, it is critical to allay farmers' fears that the new plantation will reduce yields. Furthermore, quotas for certain crops such as wheat and cotton need to be adapted for agroforestry sites as the yield of field crops may drop due to shading and space requirements of the trees. Initial financing is a prerequisite, for example, through a microcredit, to enable farmers to implement agroforestry systems with no revenue from the trees in the first years after planting.

Small-scale private poplar plantations

Growing small amounts of poplar in farmers' backyards is a traditional practice in many places in Uzbekistan. As this is commonly used as a small-scale business model in urban areas, it is advisable to integrate this planting scheme into the green nation program.

Picture 4: Small-scale private planting of poplar plantation near Olmalique, Puttkamer 2022

[5] Qiao X, Sai L, Chen X, Xue L, Lei J (2019) Impact of fruit-tree shade intensity on the growth, yield, and quality of intercropped wheat. PLoS ONE 14(4): e0203238. https://doi.org/10.1371/journal.pone.0203238

Currently, Uzbekistan is almost exclusively dependent on timber imports from Russia. Strengthening domestic timber production would reduce this dependence and promote the

Picture 5: Small private sawmill in Angren, Puttkamer 2022

Picture 6: Locally used construction timber in Karakalpakstan, Puttkamer 2022

development of a domestic timber market by creating new jobs for foresters, sawmill owners, and carpenters. Various clones were tested by Uzbek scientists planted in scientific settings several years ago. Those clones surpass the traditionally used trees' growth and structural characteristics (twisted growth) by far. The Yashil Makon Coordination Office will be a suitable institution to coordinate the selection and distribution of those new varieties.

In addition to plantings in private yards, large-scale plantations could be implemented on agricultural or on SFF land.

Silvopasture systems

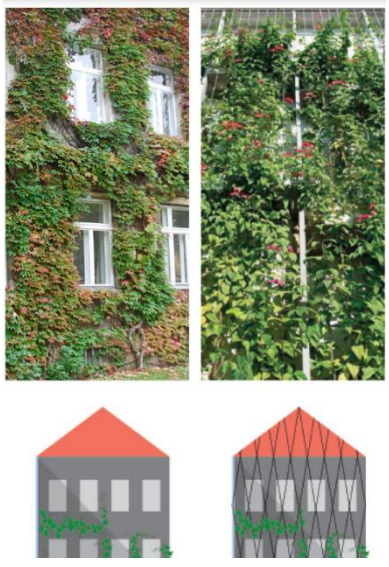
As pasture lands are adjacent to almost every settlement in Uzbekistan, it is advisable to integrate their management into Yashil Makon. Besides the benefit of wind protection, an optimized silvopastoral management approach improves the health and productivity of animals and the land. It is recommended to consider the inclusion of silvopastoral systems through lighthouse projects of 10 - 50 ha.

Picture 7: Cattle grazing in a saxaul Forest (Oregon State University).

The documented experiences of NGOs and development agencies regarding similar projects can be used for project planning and implementation. A precondition for successful silvopastoral systems is adapted legislation and incentives or subsidies for the involved farmers.

Facade greening in cities and settlements

Facade greening currently plays no role within Yashil Makon. As it is a cost-effective and straightforward method of greening, it is advisable to include it as a valid planting scheme in the Master Plan. However, greening via vertical gardens and high-tech modular constructions is not discussed further due to the high square meter costs and extensive maintenance requirements.



Graphic 6: Ground Based green walls. https://efb-greenroof.eu/green-wall-basics/

4.3 Recommendations for Master and Action Plan development related to planting scheme selection, plantation due diligence, planning, and implementation

Next to water availability and soil quality challenges, the main difficulty observed in Uzbekistan is developing planting systems that do not lead to land-use conflicts with the

agricultural sector or other stakeholders. Furthermore, achieving an acceptable survival rate of plants is a difficulty. This results in the following key observations that need to be translated into goals, priorities, and strategies of the Master Plan:

1. Although plantings in parks, around office buildings, and on yards of schools, hospitals, or kindergartens can benefit local stakeholders, it must be prevented that tree planting contradicts the primary recreational function of this area. Dense plantings are thus to be avoided. However, tree plantings embedded in the overall strategy for those parks and gardens may have many benefits, such as creating shade, improving the microclimate, serving as natural playgrounds, and enhancing aesthetics.

2. Trees planted alongside urban and peri-urban roads also have many benefits. However, they must be grown with attention to sufficient spacing (about 5 meters). If planted too densely, mortality will rise, and unstable crowns will develop.

3. Roadside and urban plantings in parks and yards are valuable measures with significant benefits for society. However, due to the space restrictions and the primary functions of those areas, they will not make up the lion's share of Yashil Makon. The significant claim can be achieved by using a) agricultural lands through the development of agroforestry systems, green belts, and plantations for timber production or fruit/nut production, and b) improved silvopasture systems.

4. A political will to support agroforestry systems has to be formed, and legislative change needs to be initiated to ensure that tree planting on farmland does not result in economic disadvantages for the involved farmers. Policy changes would be necessary regarding the following:

    - Permission to harvest timber (re-assessment of the logging ban)
    - Adjustment of agricultural quotas in case of implementation of an agroforestry system, a timber, nut or fruit plantation, or a windbreak.
    - Microfinancing and/or substitutes to help farmers with initial investments in agroforestry schemes or tree plantations.

    It is deemed necessary that farmers invest in agroforestry systems or green belts based on their own personal interests. This is to ensure long-term commitment for tree management.

5. Leskhosz's representatives identified the lack of a legal framework to regulate pasture use and weak enforcement of pastureland management rules as the critical constraints for natural forest regeneration and rejuvenation. However, regeneration in over-grazed areas is seen as one of the significant opportunities to plant/regenerate trees without generating land-use conflicts. Therefore, silvopastoral systems, as described in the Annex, may be integrated into the scope of Yashil Makon.

6. To develop a Master Plan, creating a shared understanding of the importance of due diligence for individual planting sites and comprehensive project planning is necessary, as those two phases define project success (plant survival rate, project acceptance, co-benefits, cost-effectiveness). The following recommendations may be used to develop guidelines and checklists within the framework of an Action Plan for the due diligence and planning phase:

    - The initial design of planting activities considers the input and views provided by citizens and stakeholders, including those directly affected by the activity and those involved in ensuring its correct implementation. The stakeholder consultation focuses on species selection, planting patterns, and potential risks perceived concerning the activity.

    - The initial design is evaluated against immediate and long-term social and environmental risks. It balances the needs of local stakeholders, the tree survival rate, and the highest possible sustainable tree-planting quota. It needs to be adjusted if the design does not provide net-positive social, environmental, and economic benefits or significantly harms stakeholders or the environment.

    - Planting designs are created based on up-to-date scientific evidence on species selection, tree management, risk management, and soil sciences.

    - The planting design is optimized towards local conditions regarding soil quality, main wind directions, and rain patterns, and it takes into account extreme weather events which may occur more frequently in the future. Species are selected according to their suitability to local climatic conditions and low risk of introducing pests or diseases.

    - To be able to monitor which planting schemes are efficient in the fight against climate change, reporting on mortality rate and tree growth needs to have the same importance as reporting on the number of trees planted.

- Each planting project is implemented according to a project plan and timeline that contain comprehensive information on planting activities, tree inventory, multi-year management activities, responsibilities, monitoring, multi-year costs, and a water-smart irrigation plan.
- The suitability of the selected area for the envisioned planting design (e.g., soil quality, grazing pressure, etc.) is proven through on-site verification.
- It shall be investigated which planting sites are suitable for parallel use as scientific test areas for innovative forest management systems. The cooperation of scientific institutes and project developers is to be promoted.
- Training of farmers regarding the management of agroforestry systems/tree plantations need to be provided.