



*This Project is co-financed by the
European Union and the Republic of
Turkey*

SUPPORTING THE IMPLEMENTATION OF BY-LAW ON STRATEGIC ENVIRONMENTAL ASSESSMENT

Contract N^o TR2018 ESOP MI A3 12/CNP/03

MONITORING REPORT for NITRATE ACTION PLAN

-FINAL-

September 2020



REPUBLIC OF TURKEY
MINISTRY OF ENVIRONMENT
AND URBANISATION



Environment and Climate Action
Sector Operational Programme



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DOCUMENT CONTROL SHEET

Contracting Authority	Ministry of Environment and Urbanization, General Directorate of European Union and Foreign Relations
Beneficiary	Ministry of Environment and Urbanization, Directorate of EIA, Permit and Inspection
Project	Supporting the Implementation of By law on Strategic Environmental Assessment (SEA)
EuropeAid No	TR2018 ESOP MI A3 12/CNP/03
Title	Monitoring Report for Nitrate Action Plan
Submission	25.09.2020
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TABLE OF ABBREVIATIONS

DG	Directorate General
EEC	European Economic Community
MoAF	Ministry of Agriculture and Forestry
MoEU	Ministry of Environment and Urbanization
NAP	Nitrate Action Plan
NVZ	Nitrate Vulnerable Zone
SEA	Strategic Environmental Assessment
SHW	State Hydraulic Works
TUBITAK MAM	TUBITAK Marmara Research Center

1. BACKGROUND INFORMATION

1.1 PURPOSE OF THE MONITORING REPORT

This monitoring report is prepared as a part of the Strategic Environmental Assessment (SEA) for the Nitrate Action Plan (NAP) for the Northern Aegean Basin to outline an environmental monitoring programme to be established and operated during implementation of the NAP.

The NAP was prepared in order to decrease the impact of excess nitrate use in agriculture, in accordance to the Turkish by-law on Protection of Water Bodies against Nitrate Pollution Generated due to Agricultural Activities, and based on the Nitrate Directive (91/676/EEC). NAPs are prepared for all basins in Turkey and are subject to SEA procedure.

According the Article 14 (2) of the by-law on SEA, the Competent Authority shall prepare the monitoring programme in order to detect significant adverse environmental effects that might occur during the implementation of the plan/programme and to elaborate solutions to eliminate these effects as soon as possible. In order words, the primary purpose of monitoring is to cross-check significant environmental effects which arise during the implementation stage against those predicted during the plan preparation stage.

As NAP shall be renewed at least one in four years, this monitoring report should be revised accordingly.

1.2 SEA OF NAP

The SEA process took place in parallel with preparation of the NAP document between July 2019 and October 2020 and entailed iterative consultation between the SEA and planning team of Ministry of Agriculture and Forestry (MoAF) – TUBITAK Marmara Research Center (TUBITAK MAM), which also resulted in certain revisions of the NAP draft document in response to the questions of the SEA Team.

The SEA of the NAP was carried out as follows:

First, a baseline situation, key existing problems and trends were analysed for the key environmental issues relevant for the NAP and the concerned territory, as established during the Scoping phase of the SEA. Elaboration of a hypothetical “do-nothing” scenario provided further estimation how would current situation evolve if the NAP was not implemented.

Second, an overview of existing relevant environmental objectives and commitments for each issue (environmental theme such as biodiversity, water, health) identified as relevant during the Scoping was prepared to establish a further benchmark for the NAP evaluation.

Subsequently, the assessment was carried out in a qualitative manner, based on estimation whether and to what extent actions proposed in the NAP can affect or change existing environmental conditions (trends) and to what extent they can contribute to (or negatively affect) the achievement of relevant environmental objectives.

The results of such evaluation are used for formulation of suggestions for optimization of the NAP document, as well as proposals related to its implementation arrangements and subsequent monitoring.

MoAF, as planning authority, prepared NAP considering the Nitrate Vulnerable Zones (NVZs) determined in the basin and listed a group of measures for those zones in line with Code of Good Agricultural Practices and local conditions. Measures determined for NAP to control excess nitrate in Northern Aegean Basin are categorised in 7 main groups. These are;

- Land management
- Fertilization
- Irrigation management
- Management of Plant Protection Product (PPP)

- Eutrophication management
- Keeping records
- General actions

Above listed measures can be classified in two groups; first group is mainly comprising measures to change some daily practices of farmers, whereas the second group obliges some physical investments.

In the course of the SEA, the above presented measures of the NAP were evaluated in terms of their likely effects on the major environmental issues such as soil degradation, water and groundwater, biodiversity, climate, air quality, protected areas, marine & coastal areas and public health for Northern Aegean Basin. (See the full SEA Report for NAP)

Given the nature and purpose of the NAP (with assumed overwhelmingly positive effects on the environment) the SEA analysis focused on identification of any potentially negative side-effects of the NAP implementation and on the potential for further increase of the NAP positive impact.

The SEA resulted in formulation of several suggestions and recommendations to improve effectiveness of the NAP implementation, such as:

- Prioritisation of NVZs in order to focus implementation effort on the areas where the environmental conditions are most vulnerable (i.e. where the NAP can make the biggest positive effect).
- Prioritisation of measures (based on their implementation readiness and cost-effectiveness)
- Additional measures to increase the effectiveness of NAP (See the full SEA Report for NAP).

2. MAIN EFFECTS IDENTIFIED

As indicated above, NAP has been designed to reduce agriculture-related nitrate pollution (namely its impacts on soils and water), via measures concerning the fertiliser and manure management as well as other relevant agriculture practices.

Namely following effects are expected as a result of the NAP implementation:

Soil: Soil is the first media receiving the excess fertiliser / manure and transmitting to water bodies, hence excess consumption / use of fertiliser or manure creates burden on soil structure and degrades it. Status of areas including slope, erosion risk and availability of vegetation on soil are important to consider for NAP.

Reduction of soil degradation is expected after the NAP implementation as the concentrations of nitrate shall decrease thanks to several planned measures defined by NAP directly to address the problem of soil degradation (i.e. actions 1.1.1 to 1.1.6- Complying with fertilizer application periods/conditions or T 1.3.1 to 1.3.2 - Promoting implementations which prevent soil erosion (terracing, planted agricultural area, permanent plants).

Therefore, the implementation of these measures (namely, the land management, manure management and irrigation management) of NAP will likely have significant positive effect on soil.

Water quality shall improve with NAP as the plan will have a direct positive impact on water quality in the Northern Aegean Basin. Although the envisaged actions naturally and initially affect soil, actions foreseen by the NAP will contribute to addressing following nitrate-related problems:

- Risks to human health,
- Risk of eutrophication in surface waters (affect human consumption, irrigation and bathing),
- Risk of contamination in ground waters,
- Risk of decreasing quality of crops

Through the NAP and especially with the employment of the Code of Good Agricultural Practices, over-fertilization will be minimized and negative side-effect of the fertilizers containing nitrate will be managed through practices such as terracing during soil cultivation, in order to prevent the fertilizer from reaching the water resources.

Obligation to implement the Code of Good Agriculture practices start only for the facilities generating nitrogen more than 1,600 kg/year for NVZs and 3,500 kg/year for other areas for the first stage of NAP that shall last four years.

Water quantity: The NAP primarily focuses on prevention of water pollution and soil deterioration, however, with the Action 3.1 & 3.2- Irrigation, there are two actions to make the irrigation economic and hence save the water used for agriculture.

- Waters which don't comply with the quality classification defined in the irrigation water standards framework shouldn't be used for irrigation purposes (Code 3.2)
- The irrigation method with the highest water use effectiveness should be selected. (Code 3.5)

The SEA has not identified any significant negative impact of the Actions of NAP on the water quantity. As irrigation water conservation measures are included in the NAP, the possible need to abstract water from surface or ground waters shall decline as well (sustainable water use shall be supported).

Biodiversity and ecosystems: There are many pressures that threaten biodiversity resulting from the human activities including agriculture, and relative importance of these individual factors is difficult to interpret. The effects of these factors on the (protected) species are sometimes indirect and intensified by the cumulative effects. For instance, overgrazing of meadows and pastures leads to a decrease in biodiversity due to the destruction of vegetation. Especially as a result of overgrazing and deforestation, soil erosion increases, plant diversity decreases, and consequently animal diversity is reduced.

As stated in the Code of Good Agricultural Practices, wetlands and natural wildlife are at risk of extinction due to land use change. There are no actions in the NAP specifically related to biodiversity and ecosystem protection or enhancement. However, thanks to land management-related actions of NAP, a positive impact on the environmentally sensitive areas and thus positive impact on biodiversity and the ecosystem are expected namely as secondary effects of the nitrate pollution reduction achieved through the NAP-related interventions.

Human health: Cumulative impact of NAP shall bring about namely improvement of soil and water quality. Accumulation of nitrate in surface/ groundwater or coastal water bodies shall be reduced as the fertiliser/manure dosage shall be controlled in NVZs. Decreased accumulation of nitrate in crops, and decreased concentration of nitrate in water resources shall have a positive effect for human health in the basin. However, more studies should be done on this subject and data should be collected specifically in order to improve understanding to of the effects of nitrate emissions reduction on public health. Without such research, the contribution of the NAP to the improvement of the public health will be difficult to estimate.

A set of environmental indicators that shall be monitored in order to measure effects of the NAP implementation on the key environmental issues listed above is presented in the subsequent section of this Report (See section 3.2).

3. MONITORING PROGRAMME

3.1. MAIN PRINCIPLES OF THE MONITORING PROGRAMME

This monitoring programme is prepared as a part of the SEA process in response to the requirements stipulated in the SEA by-law “in order to detect significant adverse environmental effects that might occur during the implementation of the plan/programme and to elaborate solutions to eliminate these effects as soon as possible”.

The Monitoring Programme consists of two components:

- Component 1: Monitoring of the Environmental Effects (i.e. physical monitoring of the relevant environmental indicators which can reflect environmental change caused by the NAP implementation or detect unexpected impacts of the NAP on the environment).
- Component 2: Monitoring of the NAP implementation (i.e. recording the progress of the implementation of SEA recommendations and proposed measures to enhance the positive environmental effects of the NAP).

Component 1:

The primary purpose of the first component is to cross-check significant environmental effects which arise during the implementation stage against those predicted during the plan preparation stage. Namely in order to identify at an early stage any unforeseen adverse effects and to be able to undertake appropriate remedial action.

Planning authorities (in this case, it is MoAF) have the responsibility for monitoring the effects of the NAP implementation and therefore;

- i) for devising monitoring programmes,
- ii) for ensuring that arrangements are in place for the timely collection of monitoring data from all relevant agencies and,
- iii) for evaluating the results of monitoring or ensuring that any necessary evaluations are carried out.

MoAF in coordination with other institutions and organizations (i.e. Ministry of Environment and Urbanization (MoEU)), collects all data necessary for implementation, control and evaluation of the effects of the NAP. In order to ensure that within this effort the indicators important for the monitoring of specific environmental impacts of the NAP are included, the SEA proposes the set of environmental indicators (see table in the section 3.2 below).

In order to carry out this responsibility, the MoAF will request contribution of other authorities and institutions to supply the monitoring programme with available data, e.g.

- General Directorate (GD) of Water Management and GD of State Hydraulic Works (SHW) shall provide water analyse results both for surface and groundwater.
- Provincial directorates of Ministry of Environment and Urbanization (MoEU) specifically for wastewater generated (T.2.8.7 etc.) in livestock facilities, etc. (see the indication of responsible bodies/data sources in the table in the section 3.2 below).

Component 2:

A primary purpose of the Component 2 is recording the progress of the implementation of SEA recommendations and proposed measures by SEA to enhance the positive environmental effects of the NAP are implemented or not.

The MoAF as an institution for implementation of the NAP, including the measures resulting from the SEA recommendations is primarily responsible for monitoring the significant environmental effects which arise during the implementation stage against those predicted during the plan preparation stage.

3.2. MONITORING OF ENVIRONMENTAL AND HEALTH EFFECTS DURING NAP IMPLEMENTATION

Key issues for NAP of Northern Aegean Basin were identified by SEA. Indicators related to each key issue are tabulated below.

The set of indicators was prepared with respect to the national and international documents (please refer to Chapter 3 of the SEA Report concerning Environmental Targets and Indicators Related to NAP by Considering National and International Environmental Protection Objectives). The indicators adopted from international sources were adjusted to fit the Turkey's conditions where necessary.

The proposed monitoring indicators have been put forth bearing in mind the availability of data and the feasibility of making direct links between any changes in the environment and the implementation of the NAP. However, it is acknowledged that for certain SEA proposed indicators, there are currently not available adequate data. The SEA team believes, however, that in such cases an effort should be made to ensure relevant data collection during the NAP implementation in order to improve functionality and effectiveness of the NAP. For example, it has been observed that there is a lack of available public health data especially on diseases caused by nitrate. At the same time, since one of the key NAP benefits supposedly is mitigating the nitrate-related risks to human health, it is desirable to have indicators that can document the desired effect (or lack of thereof). For this reason, even if there is currently no data, several indicators have been proposed about human health within this SEA.

In the table below, units and possible data sources are given for the indicators determined in Chapter 3 of the SEA Report for each key issue. Also, a new key issue "Stakeholder Capacity Building" has been added to show the indicators related to the stakeholder's engagement in the NAP implementation. When the task of collecting and combining the data in this table is in a single institution (MoAF), it will be easier to access the desired data at any time. Article 8 of "By-law on Protection of Water Bodies against Nitrate Pollution Generated due to Agricultural Activities" states that "the NAPs should be reviewed at least every four years and revised if necessary, including additional measures". Therefore, it is very important to collect the relevant annual data and identify trends to fulfil this obligation the Monitoring programme. Existing monitoring arrangements may be used if appropriate, to avoid duplication of monitoring.

The DG Agricultural Reform is currently preparing a new project¹ aiming, among other goals, to develop monitoring of the NAP measures implementation in selected basins. The monitoring of impacts of the NAP shall commence upon completion of this new project. The project will establish and test detailed Monitoring Methodology for NAP to be implemented in NVZs including a representative farms selection method for NAP monitoring and establishment of the reporting system. Official (expected) start-up date is May 2021.

It is envisaged, that the above described project will provide a basis for an integration of the SEA-related environmental indicators (see the table below) to the general NAP monitoring system so that the NAP monitoring can serve the function required by the SEA by-law. The reporting outputs of the NAP monitoring system thus can also meet the monitoring requirements stipulated by the SEA by-law and a duplicity in reporting will be avoided.

¹ Protection of Waters against Agricultural Pollution through Establishment of a Monitoring and Reporting Methodology for the Nitrate Action Plans, Europe Aid/140563/IH/SER/TR

Table 1: Environmental Monitoring Matrix

Key Issues	Indicators	Units	Possible Data Sources
Soil Degradation	Number of trainings provided for farmers and facilities to achieve greater fertilizer use efficiency	no.s/year	MoAF
	Share of agricultural lands with nutrient management plans to total agricultural areas	%	MoAF
	Use and frequency of soil tests expressed as the proportion of farms conducting soil tests at different frequencies or share of crop area tested	%	MoAF
	Number of days in a year that the soil is covered with vegetation	days/year	MoAF
	The amount of chemical pesticide used per year	ton/year	MoAF
	The number of testing for waters in terms of nitrate	no.s/year	MoAF
	Area of agriculture land affected by erosion	ha/year	MoAF
Water Quality	The proportion of surface water and groundwater above a national threshold value of nitrate concentration	%	MoAF, SHW, MoEU
	The nitrate concentration in water bodies in NVZs	mg/L	MoAF, SHW, MoEU
Water Quantity	Number of trainings provided for farmers and facilities that are migrating or in transition to modern irrigation systems	no.s/year	MoAF
	Proportion of irrigation systems switched to pressurized irrigation system	%	MoAF
	The number of trainings for agricultural producers to take measures that enable saving irrigation water	no.s/year	MoAF
Climatic Conditions	Change in the net total agricultural emissions of carbon dioxide, methane, and nitrous oxide expressed in CO ₂ equivalent	%	TURKSTAT
Livelihood	Share of organic agriculture area in the total agricultural area	%	MoAF
	The value of financial support to organic farming enterprises and enterprises engaged in applying Good Agricultural Practices and farmers who meet their plants' nitrogen needs from animal manure and store animal manure under suitable conditions.	TL/year	MoAF
	The number of trainings for enterprises engaged in Good Agricultural Practices and farmers who meet their plants' nitrogen needs from animal manure and store animal manure under suitable conditions.	no.s/year	MoAF
	Number of nitrate tests on samples taken from coastal waters	no.s/year	MoEU
	Coastal water quality in terms of the nitrate in the basin	mg/L	MoEU
	Water quality in terms of percentage of inland and marine water bathing waters complying with the mandatory standards and guide levels for microbiological and physicochemical parameters (%)	%	Ministry of Health

Key Issues	Indicators	Units	Possible Data Sources
Marine and Coastal Areas ²	Total biomass of phytoplankton and chlorophyll a which is a proxy for phytoplankton biomass	mg/L	MoEU
Human Health	The number of nitrite-nitrate tests on products grown especially in NVZs	no.s/year	MoAF
	Incidence of nitrate-related diseases	no.s/year	Ministry of Health
Stakeholder Capacity Building	Number of farmers with small or big facilities attended to awareness raising workshops, seminars	no.s/year	MoAF

² MoEU has been conducting pollution and quality monitoring studies in all seas of Turkey since the 2000s under the Regional Sea Conventions signed by Turkey (Barcelona and Bucharest Conventions) and national and international legislation.

3.3. MONITORING OF SEA RECOMMENDATIONS IMPLEMENTATION

SEA has formulated several recommendations, falling roughly in three categories:

- Prioritisation of NVZs considering the environmental conditions and starting to implement the NAP in different periods
- Prioritisation of measures
- Additional measures to increase the effectiveness of NAP

An overview of these individual recommendations together with an indication of how these SEA recommendations are considered in the NAP finalization and/or implementation is provided in this section.

The progress in implementation of those SEA recommendations accepted by the NAP responsible authority shall be reported as a part of the NAP monitoring to fulfil the requirements stipulated by the SEA by-law.

Table 2 : Implementation monitoring matrix template

Relevant SEA recommendations and mitigation measures	How SEA recommendations have been implemented	Comments/further action required
SEA recommends to conduct a dedicated analysis of the existing capacities to control and enforce the NAP measures and to identify needs for further improvement. Such analysis can form either part of the NAP document or can be elaborated subsequently in the course of NAP implementation preparatory process.	NAP team accepted but a detailed analysis is required, shall be reflected till the finalization of NAP The DG Agricultural Reform is currently preparing a new project aiming, among other goals, to develop monitoring of the NAP measures implementation in selected basins. Within this project the monitoring and overall implementation capacities will be studied in order to prepare functional structures for the NAP implementation, control and monitoring. The projects outputs will inform further actions towards improving the implementation process, including potential prioritization of certain measures or areas suggested by the SEA.	A monitoring and reporting infrastructure will be created that will evaluate both the effective implementation of the NAP and the effectiveness of the actions in the NAP as a whole. The capacities of implementing local authorities will be examined and adjusted prior the start of NAP application.
Prioritization of NVZs	NAP team accepted the principle, but a detailed further analysis is required to determine feasibility and utility of preferential treatment of priority NVZs.	After completion of NAP document, but before implementation initiation in 2023 details shall be clear
Prioritization of actions	NAP team accepted the principle, but a detailed further analysis is required to determine feasibility and utility of preferential implementation of priority Actions.	After completion of NAP document, but before implementation initiation in 2023 details shall be clear
Saving in irrigation systems	Accepted within NAP.	Modern irrigation systems also enable water saving and this is included within the NAP.
Pre-treatment in big facilities	Rejected	Instead of this mechanical equipment to use the mixture of solid and liquid manure on soil might be promoted
The NAP shall present the quantification (quantified estimation) of the effects of proposed actions in terms of reduction of nitrogen emissions to understand if the recommended actions are working.	NAP team accepted but a detailed analysis is required, shall be reflected till the finalization of NAP	NAP is conducting modelling studies for reduction of nitrate emissions. In addition, there is also an IPA project ³ where this issue will be discussed in detail. With this new project, a monitoring and reporting infrastructure will be created that will evaluate both the effective implementation of the NAP and the effectiveness of the actions in the NAP as a whole.

³ Protection of Waters against Agricultural Pollution through Establishment of a Monitoring and Reporting Methodology for the Nitrate Action Plans, Europe Aid/140563/IH/SER/TR

Relevant SEA recommendations and mitigation measures	How SEA recommendations have been implemented	Comments/further action required
Providing support to the animal husbandry facilities for implementing water conservation technologies	NAP team not accepted	Reducing water consumption in livestock farms is an important issue, and it is expected that the NAP measures related to the modernization and improvement of animal husbandry will have also positive side-effect on the water consumption in such facilities. However, the water conservation as such is not the purpose of the NAP. Water conservation measures are supported by other policies than NAP.
Incentives for farmers (grants if possible) for constructing manure silos	NAP team accepted	Grant support is provided with IPARD and Rural Development Support Programme for manure silos. With NAP section 5.2.7 a study for involvement of these grants to DG Agricultural Reform is considered.
The design of the animal manure storage areas shall take into account the risk of rain or torrential rain fall on the deposited material, and following spill of contaminated water. Therefore, storage areas can be covered as well as sealed.	NAP team accepted	MoAF recommends silos to be covered. If not, it is required to consider the rain water volume for the design of the silos.
A template shall be created and provided to the relevant stakeholders for fertilizer management plan. In addition, the details of how the control will be performed after the plan has been prepared are uncertain. After the template prepared for the fertilizer plan is shared on MoAF's website, a computer application system can be created for the farmers who prepared the plan to upload the plan.	NAP team accepted	Guidance on using fertilisers, considering the analyses of soil, and Ministry's fertiliser recommendation guide is included to NAP. Methods to control their application and impact of the NAP shall be evaluated within the new project and a web-based software shall be used to collect relevant data.
Considering to include a new measure related to application of the nitrification and urease inhibitors.	NAP team accepted	Section 5.2.8 of NAP considers this.
The implementation of Action 2.4 is clearly associated with loss of yield in such lands, while benefits to the water resources will be not reflected in the economy of the given farm. Therefore, the farmer shall be	NAP team accepted	There is a Ministry policy for supporting the protection of the environment. For effective implementation of the measures these grants should be provided.

Relevant SEA recommendations and mitigation measures	How SEA recommendations have been implemented	Comments/further action required
compensated (i.e. in the form of special grants) for the implementation of this action (i.e. for the loss of yield from the buffer zones and green belts).		
Particular attention should be paid for the actions to be taken in especially Troy National Park, Ayvalık wetlands and the Sarımsaklı Natural Park, since they are located in the NVZs.	NAP team accepted	NAP team shall consider



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