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EVALUATION OF LIFE MICA'S ECONOMIC IMPACT

LIFE MICA project

The aim of this report is to serve as detailed documentation for the D3.2 Evaluation of LIFE MICA's economic impact of the grant agreement

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1 INTRODUCTION

The overall objective of the LIFE MICA project is to reduce coypu and muskrat populations to a manageable size in order to prevent damage to waterways, biodiversity and agricultural crops.

This report is a deliverable for action D3 'Evaluation of the socio-economic aspect', which consists of two sub-actions D3.1 Evaluation of LIFE MICA's social impact and D3.2 Evaluation of LIFE MICA's economic impact of the grant agreement. The aim of this report is to serve as detailed documentation for the **economic impact (D3.2)**.

The Unie van Waterschappen (UvW), 'Dutch Water Authorities', is responsible for this action.

Reading guide
Chapter 2: Evaluation Approach, discusses the data collection techniques and indicators used to measure the project's economic impact.
Chapter 3: Economic Impact, focuses on the economic impact of the project.
Chapter 4: Conclusions, provides a summary of the project's economic impact.

2 EVALUATION APPROACH

2.1 DATA COLLECTION

An Excel spreadsheet was developed to collect data and was used for requesting the evaluation of the social-economic impact. The use of a spreadsheet for data collection provided a structured framework for organizing and analyzing the project-related data.

For both types of impact, Key Performance Indicators (KPI) were defined. Each KPI was measured by parameters. More information about the KPIs and parameters can be found in the next section (indicators for economic impact).

The data collection involved partners filling in project-related data over two periods, 2020 and 2022. After the completion of data collection in both periods, UvW analyzed the collected data and synthesized the results into this report. The analysis of the data provided insights into the project's socio-economic aspects, such as the changes in social and economic aspects through time. This report focuses on the economic impact.

The content of this report is based on inputs from all partners. The overall coordination of the economic impact was handled by UvW and mail contact has been used to collect the data and to update the partners about the progress. A final draft version of this report was shared and reviewed by all partners.

2.2 PROJECT PARTNERS

The partners consulted for the data collection are listed below.

The Netherlands

- Unie van Waterschappen (UvW) - Dutch Water Authorities
- Universiteit van Amsterdam (UvA) - University of Amsterdam
- Waterschap Rivierenland (WSRL) - Waterboard Rivierenland

Belgium

- Vlaamse Milieumaatschappij (VMM) - Flanders Environment Agency
- Instituut Natuur- en Bosonderzoek (INBO) - Research Institute for Nature and Forest

Germany

- Landwirtschaftskammer Niedersachsen (LWK NDS)
- Stiftung Tierärztliche Hochschule Hannover (TiHo), Institut für Terrestrische und Aquatische Wildtierforschung (ITAW) - (University of Veterinary Medicine Hannover (TiHo) Foundation, Institute for Terrestrial and Aquatic Wildlife Research (ITAW))

2.3 INDICATORS FOR THE ECONOMIC IMPACT

The **Employment KPI** is simply calculated as the number of new jobs provided by the different beneficiaries whose recruitment necessity is directly connected to the imple-

mentation of LIFE MICA. These new jobs can range from trappers and hunters to lab members.

KPI	Description	Parameter
Employment	Number of new jobs provided by the different beneficiaries whose recruitment necessity is directly connected to the implementation of LIFE MICA.	Number of new jobs in FTE's connected to LIFE MICA (in FTE).

The **Expected revenue KPI** will be calculated as the avoided damage costs minus the implementation costs. The damage costs mainly consist of flood damage and crops deterioration. Using the above-mentioned baselines, it is possible to reckon what the reparation and loss costs should be over a certain period of time. The difference with the actual reparation and loss costs make for the avoided damage costs. Since the water authorities are the ones to take care of said reparations, and the one the farmers turn to in order to complain about the damage caused by the IAS, the financial data is easily available.

KPI	Description	Parameter
Expected revenue	Calculation of the avoided damage costs minus the implementation costs. The damage costs mainly consist of flood damage and crops deterioration. Using the above-mentioned baselines, it is possible to reckon what the reparation and loss costs should be over a certain period of time. The difference with the actual reparation and loss costs make for the avoided damage costs. Since the water authorities are the ones to take care of said reparations, and the one the farmers turn to complain about the damage caused by the IAS, the financial data is easily available. Only LIFE MICA areas.	Number of kms dikes and dams
		% of dikes and dams in working condition
		Number of floodings
		Number of trapped muskrats and coypus
		Repair costs for dikes and dams as a result of digging by muskrats and coypus
		Crop damage in € from feeding by muskrats and coypus

The **Expected Revenue/Payback time**, if alone, can be deceiving because the return on investment will not be immediate. Indeed, implementation represents a big yet one-time investment, while the avoided damage costs keep progressively increasing with time. Even if some maintenance costs may arise because of LIFE MICA, they are expected to be much smaller than the benefits per year. Over time, LIFE MICA will eventually become moneymaking. This duration will be evaluated by the Payback time KPI, which will be easily inferred from the Expected revenue KPI (the time when it becomes positive).

KPI	Description	Parameter
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	time investment, while the avoided damage costs keep progressively increasing with time. Even if some maintenance costs may arise because of LIFE MICA, they are expected to be much smaller than the benefits per year. Over time, LIFE MICA will eventually become moneymaking . This duration will be evaluated by the Payback time KPI, which will be easily inferred from the Expected revenue KPI (the time when it becomes positive).	Expected revenue eDNA
		Expected revenue smart life traps
		Expected revenue smart camera trapping

The **Reduction of cost** per process is measured as the variation of IAS catching cost-effectiveness between LIFE MICA's and the current ones. It is defined as the average price to pay to catch a targeted animal. All costs must be included: from the research of the burrows' location to the cost of the trap and the human resources. The cost effectiveness has to be empirically evaluated on a global scale. Indeed, not only can the pure efficiency of the traps be calculated over large time periods and spatial distribution, but also the costs are of many kinds, some having meaning only when considering the bigger picture.

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		Reduction of cost due to eDNA
		Reduction of cost due to smart life traps
		Reduction of cost due to smart camera trapping from 2021 and onwards

3 RESULTS ECONOMIC IMPACT

3.1 EMPLOYMENT

The employment KPI for the LIFE MICA project is measured by the number of new jobs provided by the various beneficiaries whose recruitment necessity is directly linked to the project. This KPI is an essential aspect of the project's success as it not only measures the number of new jobs created but also ensures that the jobs are directly linked to the project's implementation. By measuring this KPI, the project team can monitor the progress of the project and evaluate its success in creating new job opportunities.

In the period 2020-2022, some of the project partners created new jobs in Full Time Equivalent (FTE) positions.
UvA indicated in 2020 that they had a 1.0 FTE with starting and ending date (01-01-2020 till 30-06-2023). As of 1-7-2023, a position has been created at Wetterskip Fryslan. The employee involved will supervise the implementation of eDNA monitoring of muskrats and coypu at all control organizations.
ITAW created 1.5 FTE job position for the duration of the LIFE MICA project.
INBO created 1 FTE. The extra FTE was created at EVINBO, and will continue to work at EVINBO on different external projects.
WSRL created 4 FTE. In 2022, WSRL created 1.0 FTE for the function of project coordinator. This position runs until the end of 2023. Three external people have been hired to set up and carry out monitoring research into reed vegetation and other species. They do not have a full-time position and do not work all year round (to be used temporarily in the period May-August 2020-2023). Furthermore, there are two muskrat managers who work with smart life traps (end of 2021 until now). This is also not a full-time job, they do this in combination with their current work. In addition Euroquality is hired for project support, these are two people who work for WSRL part time. There are also some functions that fall under overhead, such as financial assistant and secretarial support. For all the above positions a total of 4 FTE is the estimate.
VMM created 1 FTE, initial contract on LIFE MICA from start of project to the end of project, will be added to own staff after LIFE.

3.2 EXPECTED REVENUE

The data originating from the Netherlands comes from Waves: https://live-waves.databank.nl/jive.

	Number of km's dikes and dams (only in and around Life MICA areas!)		% of dikes and dams in working condition*		Number of floodings
UvW	**2020**	**2022**	**2020**	**2022**	
WF	3.275 km	3.628 km (leg-ger changed)	86%	96%	0
HHNK	1.329 km	1.327 km	32%	91%	0
H&A	895 km	895 km	98%	99%	0
VMM	**2020**	**2022**	**2020**	**2022**	
Sint-Laureins	-	30 km	-	100%	0
Hoogstraten	-	33 km	-	100%	0
Mark	-	28 km	-	100%	0
De Luysen		15 km	-	100%	0
WSRL	**2020**	**2022**	**2020**	**2022**	
WRIJ	184 km	184 km	21%	21%	0
WSRL	876 km	876 km	15%	15%	0

*Working condition: comply to the safety standards for flood defences (Dutch: voldoet aan de norm).

It is seen that more flood defenses are in working condition. This was not a result of LIFE MICA.

	Number of trapped Mus-rats		Number of trapped Coy-pus	
UvW	**2020**	**2022**	**2020**	**2022**
WF	400	435	-	-
HHNK north	320	2357	-	-
H&A	3266	2350	186	169
VMM	**2020**	**2022**	**2020**	**2022**
Sint-Laureins	350	453	0	0
Hoogstraten	0	0	0	0
Mark	7	34	0	0
De Luysen	0	0	2	1
WSRL	**2020**	**2022**	**2020**	**2022**
Gelderse Poort*	128	403	60	168
LWK NDS	**2020**	**2022**	**2020**	**2022**
Aschauteiche	0	0	20	18
Vechte	134	242	187	69
Dummer	20	27	69	44

* These are the numbers from 1-9-2019 (start of the project) till 31-12 -2022 in Gelderse Poort.

Regarding the parameter **Repair costs for dikes and dams as a result of digging by muskrats and coypus.**

LWK NDS (2022)
For the entire German Federal state Niedersachsen (Lower Saxony) applies (thus not only the project area, but the whole Federal state): A fully monetary valuation of these damages does not take place. A precise differentiation of the damages is not possible because minor damage in the context of ongoing maintenance and construction work would be remedied. The Wasserverbandstag e.V. (association of 105 entertainment associations) has analyzed the damage caused by the invasive species coypu for the years 2017 to 2020 from the annual accounts of the Lower Saxony entertainment associations. The damage analysis seems plausible as it correlates with catches. In 42 entertainment associations, the damages amounted to €680,450.30. The individual arrangement gives the following picture:
2017: €36.091,61
2018: €99.425,79
2019: €219.447,30
2020: €325.485,60

UvW (2022)
In the Netherlands, due to intensive professional muskrat and coypu control, there is hardly any excavation damage to dikes and dams.

For the parameter **crop damage in € from feeding by muskrats and coypus** the following was noticed.

LWK NDS (2022)
Damages were caused to the banks of the waters, to the waterbed and to the bottom. A comprehensive documentation of the damages caused by muskrats and coypus to agricultural crops does not exist because those damages are not compensated. However, there are occasional non-systematic reports on feeding damage on agricultural crops.

In Belgium we know there is crop damage from muskrats in Wallonia, since there is a reasonable population of muskrat. In Flanders (where all project sites are situated) there is no relevant crop damage nor are there ever any complaints from agriculture.

UvW (2022)
In the Netherlands, there is virtually no damage to crops by muskrats and coypu. The Netherlands does not have its own coypu population, as there is only influx from Germany. The muskrat population continues to decline, the Dutch project areas have a relatively low muskrat population, eating crops by muskrats does not occur here.

3.3 PAYBACK TIME

Expected revenue DNA Mapping
UvW
Migration routes can be better determined. Thus, traps can be placed on migration routes.

Expected revenue eDNA
UvW/UvA
The use of the eDNA method is especially interesting at lower population densities. The benefits are diverse:

- a lot of time can be saved in searching for target species, so the work remains interesting for the relevant trappers;
- a negative track confirms the absence of target species;
- only with a positive track is follow-up necessary in the form of detailed sampling and/or searching for the target species.
- Water samples may also be used in the future for eDNA detection of other (semi)-aquatic invasive species, which further increases the cost effectiveness of the approach.

Expected revenue smart life traps
WSRL
The smart life traps are still being developed and are not yet as efficient as normal life traps or life traps with gps. They are expected to be fully developed by 2025. Depending on how many will be deployed it will lead to a reduction of workload for trappers.

Expected revenue camera trapping
VMM
2020: If camera traps work as described in the project, we expect to be able to reduce the number of prospections in low-density areas from 2 visit/year to 1 visit per year. Monthly visits to recover memory cards, administration and uploading and maintaining vegetation are to be considered in the business case.

2022: Based on our estimates and the quite extensive use of camera traps in Flanders we think we can reduce the efforts in Flanders with ca. 1FTE ~ € 66000 if the camera traps would be more independent of frequent visiting.

3.4 REDUCTION OF COST

Reduction of cost due to DNA Mapping
DNA Mapping was not set up to save costs but to identify migration routes. After the migration routes have been identified, the risk of recolonization decreases.

Reduction of cost due to eDNA
UvW/UvA
Based on the starting situation in terms of population density and the control approach of Friesland and the eDNA approach as set up during the LIFE MICA project, a conservative saving of 50% appears to be possible compared to the costs involved with conventional methods. A more detailed description and calculation of the savings is included in deliverable C.2.1.1 Standardized eDNA based monitoring protocols for early prevention of repopulation.

Reduction of cost due to smart life traps
WSRL
Now it still costs money. If all current cage transmitters are replaced by the smart life trap's, at least the weekend surcharge for the catchers will be abolished (saving € 12.000 per year). This will result in a direct saving in both time and money.

Reduction of cost due to camera trapping from 2021 and onwards
VMM
In 2020, there was no reduction in cost due to the training of image recognition and practical implementation.

In 2022, it is noted that cost reduction is highly dependent on muskrat density. In high densities, there is no reduction in cost, indicating that the camera trapping system may not be as effective in these conditions. However, in low densities, there is potential for significant cost reduction if the camera trapping system were to be more automated. This finding suggests that there is room for improvement in the camera trapping system's design and automation, which could lead to increased cost-effectiveness and efficiency.

4 CONCLUSIONS

The following conclusions can be drawn from the results on the economic impact of the LIFE MICA project.

Employment: In conclusion, the project played a role in creating new employment opportunities linked to the LIFE MICA project. As the project unfolded over time, more jobs were added. Some of the jobs are temporary, whilst others continue after the completion of LIFE MICA. This shows that the project offered immediate work opportunities, but also contributes to ongoing employment.

Expected revenue/payback time: The results emphasize the significance of taking various factors into account for the expected revenue. These include, among others, the reduction of workload for trappers, time savings, as well as the potential applicability of certain methods to other aquatic species, thus improving overall cost-effectiveness. Some of the methods have to be fully developed to lead to the reduction of workload for example. For eDNA monitoring in particular, the combination with a cooperative approach will lead to significant cost savings for muskrat control in the Netherlands. As a result of the eDNA monitoring, there is also an independent assessment of whether or not muskrats are present

Reduction of costs: By examining the reduction of costs, an understanding was created in the individual impact on the reduction of costs for each method.
DNA Mapping was not set up to save costs but to identify migration routes. After the migration routes have been identified, the risk of recolonization decreases.
Based on the starting situation in terms of population density and the control approach of Friesland and the eDNA approach as set up during the LIFE MICA project, a conservative saving of 50% appears to be possible compared to the costs involved with conventional methods.
For smart life traps it now still costs money. If all current cage transmitters are replaced by the smart life trap's, at least the weekend surcharge for the catchers will be abolished (saving € 12.000 per year). This will result in a direct saving in time and money.
As for the camera trapping, there is room for improvement in the camera trapping system's design and automation, which could lead to increased cost-effectiveness and efficiency.