LIFE VIMINE

NATURA 2000

THE PROJECT IN BRIEF

Title
LIFE VIMINE[1] - An integrated approach to the sustainable conservation of intertidal salt marshes in the lagoon of Venice

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1. The word VIMINE, acronym of **V**enice **I**ntegrated **M**anagement of **IN**tertidal **E**nvironments, reminds of the flexible branches of trees such as the willow (Vimen in Latin), which, according to letter of Cassiodorus to the Venetians in the 6th century, were used by the ancient inhabitants of the lagoon to reinforce the soil of the islands and protect it from waves. Literally, VIMINE means "made with the willow" in Latin.

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On the cover page, an aerial photo of salt marshes in the northern lagoon of Venice, a labyrinth crossed by winding channels and creeks locally known as “ghebi”
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THE LIFE VIMINE PROJECT
AN INTEGRATED APPROACH TO THE SUSTAINABLE CONSERVATION OF INTERTIDAL SALT MARSHES IN THE LAGOON OF VENICE

The LIFE programme is the European Union's financial instrument to support concrete actions for the safeguarding of nature and biodiversity, the protection of the environment and climate change mitigation and adaptation.
The LIFE VIMINE project aims to define a novel integrated approach to landscape management, with the goal of protecting the most interior salt marshes of the northern lagoon of Venice from erosion. These unique habitats, part of the ecological network Natura 2000 created to protect biodiversity in Europe, are rapidly disappearing because of natural processes and, mainly, various types of human impacts.
The LIFE VIMINE project aims to prevent erosion by creating many small and diffuse soil-bioengineering protection works, made with biodegradable materials and characterized by a low environmental impact, assigning a key role to the planning, monitoring and maintenance phases of such works.

The core of the project is the involvement of local communities and stakeholders: through their knowledge and bond with their land, they will secure a long-term future for the proposed integrated approach. The project tests the efficacy of this integrated approach in the area of the Burano, Mazzorbo and Torcello Islands and of the Laghi wetland (Palude dei Laghi).

This booklet, created in the framework of the dissemination activities of LIFE VIMINE, aims to illustrate the project goals and activities using a simple language. Suggestions are also provided for all those who want to concretely contribute to the project and collaborate on the protection of the lagoon.

LIFE VIMINE
VENICE
INTEGRATED MANAGEMENT
OF INTERTIDAL ENVIRONMENTS

THE EROSION OF THE LAGOON OF VENICE

The value of wetlands

In the past, *wetlands* such as swamps, marshes and lagoons were considered unhealthy or useless and they were drained through land reclamation. Over the past decades, however, research has clarified that these peculiar environments, where land meets water, are precious. Wetlands have an enormous value for nature because they host several plant and animal species, for example migratory birds, amphibians, insects and fishes. The presence of wetlands provides many concrete benefits to humans known as *ecosystem services*: these areas capture carbon dioxide from the air mitigating climate change, abate pollutants in the water, represent reservoirs of water to be used for irrigation or for storing the peak discharge of rivers (thus reducing flood risk), and support economic activities such as fishing, hunting and eco-tourism.

WETLANDS:
RESERVOIRS
OF BIODIVERSITY AND
BENEFITS FOR MAN

The erosion of salt marshes

In the lagoon of Venice, the largest wetland in the Mediterranean, environment and society have evolved together over the centuries. The lagoon was fundamental for the rise of the Most Serene Republic of Venice, providing it with protection from enemies and coastal storms, with a strategic access to the sea and with products such as salt and fish. Man, in exchange, acted to preserve it, even diverting major rivers out of the lagoon to prevent it from being filled up with sediments. Today, however, this balance is broken and the lagoon is threatened by man. Indeed, one of the most serious environmental problems of the lagoon is the ongoing process of diffuse *erosion* that is emptying it from sediments: so, lagoon bottoms deepen and flatten and *salt marshes* (locally known as "barene"), one of the most precious environments of the lagoon, are consumed by currents and waves. Salt marshes are unique environments: these low-lying, small islands covered by grassy vegetation are found in an extremely narrow range of elevation (from 20 to 50 cm above the mean sea level), periodically submerged during high tides, and host several rare birds and peculiar plants able to tolerate salt. Over the past century, the lagoon surface covered with salt marshes decreased by more than 70%: the loss of salt marshes is accompanied by the disappearance of the incredible variety of animal and vegetal species that they host, of the typical lagoon landscape and of all the benefits that, being wetlands, they provide to humans.

The thousand-year-old basilica church of Torcello seems to emerge from the lagoon bottoms and salt marshes: there is an ancient and close relationship between man and nature in the lagoon. Author: Renato Greco - Videocommunication Service, City of Venice

Flowering salt marshes. Author: Vittorio Busatto

The causes of erosion

The erosion of the lagoon and its salt marshes is not only due to natural processes, such as the action of the waves generated by the wind, but it mainly depends on man. The diversion of rivers out of the lagoon has reduced the external input of sediments which can recreate salt marshes, while the construction of jetties at the lagoon inlets and the excavation of deep lagoon channels, to allow the transit of large cruise and cargo ships, have increased the loss of sediments to the sea. The waves generated by too fast motor boats erode salt marsh edges, and clam fishing techniques dredging the lagoon bottoms resuspend sediments that are eventually lost to the Adriatic Sea. Moreover sea level rise and soil subsidence threaten to submerge the salt marshes.

The Natura 2000 network to protect biodiversity

To protect the salt marshes of the lagoon of Venice from erosion, the European Union has co-funded the project LIFE VIMINE through the LIFE Programme. This programme contributes to implement the European Directives "Habitats" (92/43/EEC) and "Birds" (2009/147/EC), whose objectives include the development of the *Natura 2000* ecological network, which comprise the lagoon. The Natura 2000 network, created to protect biodiversity in Europe, that is to safeguard habitats as well as animal and plant species, is composed by Special Protection Areas (SPA's) and Sites of Community Importance (SCI's): the lagoon of Venice is classified both as SPA and SCI, witnessing its huge value for nature.

THE EROSION OF SALT MARSHES IS CHIEFLY DUE TO HUMAN CAUSES AND SO IT CAN BE STOPPED

Salt marshes in the northern lagoon of Venice

Aerial view of salt marshes. Author: Emiliano Ramieri

THE GOALS OF THE PROJECT

The protection of salt marshes through the routine maintenance of the lagoon landscape

LIFE VIMINE aims to demonstrate the effectiveness of an *integrated approach* to protect the most interior salt marshes of the lagoon of Venice from erosion, that is those salt marshes which are distant from the main channels and the areas impacted by strong waves and currents. For these delicate environments, innovative protection techniques are needed: indeed, the shallow bottoms surrounding these salt marshes are inaccessible to the classical mechanical means commonly used to carry out works against coastal erosion, except with huge costs and the risk of damaging those same areas to be protected. The solution of LIFE VIMINE is to create small but spatially-diffuse *soil-bioengineering* protection works, for example fascines made of wooden branches tied together, to protect salt marsh edges from waves and currents.

These protection works are of small size, mainly created through manual labour and using biodegradable materials such as wood, and thus they respect the environment and the landscape. The protection works are constructed only in strategic locations, chosen to stop erosion before it starts, and their effectiveness over time is ensured by a *continuous monitoring* which allows to carry out *routine maintenance* as soon as needed. In this way, the *prevention* of erosion is achieved at low cost, thus implementing a methodology which contrasts the common approach to managing hydraulic risk and erosion in Italy which is based on large, expensive, one-off and irreversible works

TO STOP THE LAGOON DETERIORATION THERE IS A NEED FOR INNOVATIVE TECHNICAL SOLUTIONS AND AN INTEGRATED AND PARTECIPATED APPROACH

The project area of LIFE VIMINE in the northern lagoon of Venice: the soil-bioengineering works protect the salt marshes shown in the photo, but protection works have a higher density in the salt marshes found in the rectangles identified by the letters from A to E (Palude dei Laghi). Author: CVN, flight 30/08/2013

Fascines of LIFE VIMINE to protect salt marshes

The participation of stakeholders and the integrated approach

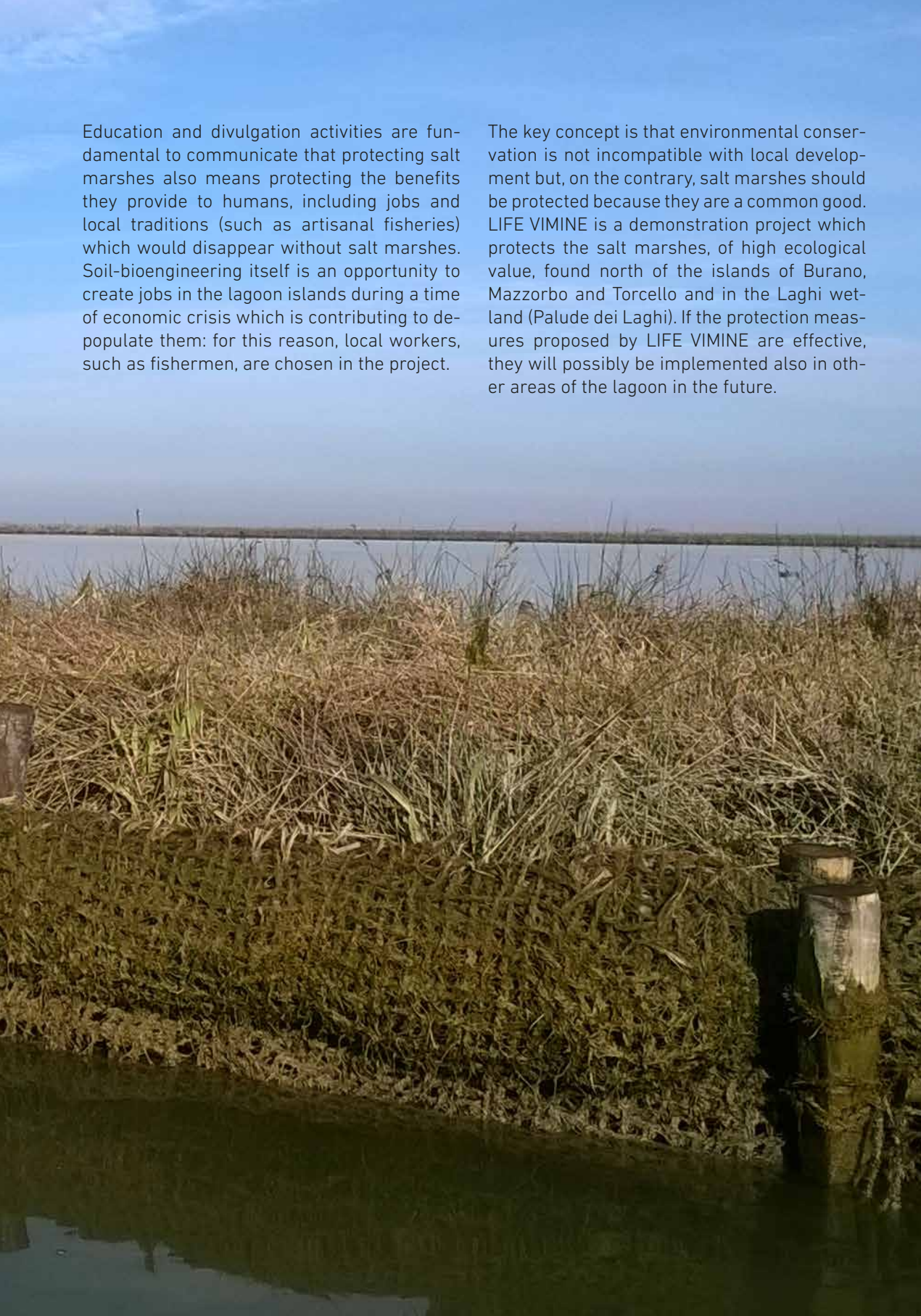
The causes of erosion are mainly human and linked to our models of development and lifestyles. Thus, engineering solutions are not enough to secure long-term salt marsh protection, erosion must also be addressed at the socio-economic level through an integrated approach, as the history of Venice teaches us: man and lagoon have always been profoundly linked together.

To protect salt marshes in a sustainable way, LIFE VIMINE encourages the active *participation* of local communities and stakeholders in the project activities, in many different manners: for example with workshops, co-design of protection works, voluntary lagoon monitoring, and participatory actions aimed to promote those businesses which make use of salt marshes in a respectful manner.

LIFE VIMINE fascines

Education and divulgation activities are fundamental to communicate that protecting salt marshes also means protecting the benefits they provide to humans, including jobs and local traditions (such as artisanal fisheries) which would disappear without salt marshes. Soil-bioengineering itself is an opportunity to create jobs in the lagoon islands during a time of economic crisis which is contributing to depopulate them: for this reason, local workers, such as fishermen, are chosen in the project.

The key concept is that environmental conservation is not incompatible with local development but, on the contrary, salt marshes should be protected because they are a common good. LIFE VIMINE is a demonstration project which protects the salt marshes, of high ecological value, found north of the islands of Burano, Mazzorbo and Torcello and in the Laghi wetland (Palude dei Laghi). If the protection measures proposed by LIFE VIMINE are effective, they will possibly be implemented also in other areas of the lagoon in the future.



THE ACTIVITIES OF THE PROJECT

Soil-bioengineering techniques against erosion

To protect salt marshes from erosion, LIFE VIMINE employs soil-bioengineering techniques, i.e. techniques which exploit natural materials and processes, such as wood or the consolidation of soil by plant roots. The strategy is to prevent erosion by constructing small but numerous protection works. It is a soft approach, designed for the most interior salt marshes: lightweight and reversible but diffuse protections are created, with low environmental and landscape impact because they are made with biodegradable materials, such as wood, and with manual labour and lightweight mechanical means.

The basic module of protection works is the *fascine* of wooden branches, with a length of about 2 m and a diameter of 35-40 cm, wrapped in a coconut net and tied with vegetal cords. The fascines, placed in two or three superimposed lines sticking to the salt marsh edge, are anchored to wooden poles planted in the lagoon bottom by using chords made of natural fiber (for example sisal). In this way, a fascine barrier is created with a total length ranging from 2 to tens of meters depending on the site to be protected, defending the salt marsh edge from waves and currents without, however, stopping the water exchange with the lagoon which contributes to vivify the salt marsh.

The small spaces between fascines and the edge of the salt marsh are manually filled with sediments, to increase the durability of the fascine which better sticks to the salt marsh and biodegrades slowly if saturated with mud. If the salt marsh edge has entirely disappeared, small pumps can be used to place sediment, collected from a neighbouring tidal flat (locally known as "velma"), behind the fascines. The manually or mechanically nourished sediment is quickly colonized by vegetation which, with its roots, protects the soil from erosion. The result is thus the reconstruction of small salt marsh areas.

About 4000 fascines will be produced in the project and used to create fascine barriers and, also, a few experimental protection works (small groynes, wind barriers) to locally modify water currents reducing erosion and promoting the opposite process, sedimentation.

SOIL-BIOENGINEERING: AN ECO-FRIENDLY METHOD TO PREVENT EROSION

Sediment pumped behind the fascines to restore an eroded portion of salt marsh

The mud nourished behind the fascines is quickly colonized by salt marsh plants

The local supply chain of wooden material to produce fascines

LIFE VIMINE has made the innovative choice to self-produce the wooden material needed to create the fascines and poles used to protect the salt marshes. The wood is obtained from routine forest management activities (such as pruning and selective thinning of trees and shrubs) carried out in the woods and parks and along watercourses in the mainland of Venice, as well as in the wooded areas of the lagoon islands found in the project area.
Such wood is supplied free of charge by land management public bodies (for example the project partner Consorzio di Bonifica Acque Risorgive or the Woods and Great Parks Institution of the City of Venice) and by local farms. In this way, LIFE VIMINE creates a short supply chain of wooden material. This kind of supply chain, created according to the principles of re-use and circular economy, has environmental and economic advantages: the waste generated by the management of public and private wooded areas becomes a resource, to be transported only for short distances with a reduction of costs and CO_2 emissions.

A SHORT SUPPLY CHAIN OF WOODEN MATERIAL GUARANTEES ENVIRONMENTAL, SOCIAL AND ECONOMIC SUSTAINABILITY

Moreover, in the supply chain, LIFE VIMINE has chosen to hire workers who are resident in the lagoon, such as fishermen of Burano, thus creating local jobs.
To produce fascines, the branches are cut to a length of about 1.5-2 m and grouped to achieve a diameter of about 35-40 cm. Then, fascines are tied with iron wire and wrapped in a coconut net and cords. Even the cords used to anchor the fascines to the poles in the lagoon are made of vegetal material, for example they come from the recycling of sisal ropes discarded from lagoon waterbuses. The project has two worksites for the storage of wooden materials and the production of fascines: in the mainland, near the water pumping station Zuccarello of Consorzio di Bonifica Acque Risorgive, and in the lagoon, on the Laghi island (Isola dei Laghi) located north of Mazzorbetto.

The wood to create fascines and poles is obtained from forest management activities, carried out for example along the rivers and channels of the lagoon watershed

Fascines ready to use are unloaded on a salt marsh

Routine monitoring and maintenance of the protection works

The soil-bioengineering works have a critical issue: waves, salt and microorganisms consume wood and ropes, and so the protection works must be monitored and their routine maintenance must be carried out to keep such works effective over time. LIFE VIMINE makes this critical issue its strength: part of the workers who place the fascines in the lagoon, regularly monitoring them and carrying out maintenance as soon as they are damaged, are hired among the inhabitants of the lagoon islands, paying particular care to the unemployed and the people who know the lagoon and frequent it, such as fishermen.

THOSE WHO LIVE THE LAGOON DAY BY DAY CAN HELP TO WATCH OVER IT AND TAKE CARE OF IT

Fishermen while carrying out routine maintenance of fascines in the lagoon

By choosing local workers, LIFE VIMINE aims to demonstrate that the protection of the environment is not a constrain to local economic development, but, on the contrary, it is an historic opportunity to create jobs in the lagoon islands that are depopulating and to reinforce the bond between the lagoon and its people.
LIFE VIMINE encourages the participation of the entire population to the monitoring of the lagoon, because people who are regularly present there can make a substantial contribution to lagoon protection, by reporting where action is quickly needed to prevent erosion.

To involve local communities, LIFE VIMINE has created a digital platform (lifevimine.crowdmap.com) where anyone can report the critical issues noticed in the lagoon, but also beautiful areas whose value is to be promoted and enhanced. The reports are reviewed by the project team and forwarded to institutions for action in priority cases. The results of the monitoring activity will be summarized in the Landscape and Biodiversity Laboratory through the creation of maps, downloadable from www.atlantedellalaguna.it, the Lagoon Atlas geoportal, together with the scientific data collected in the project and made publicly available to contribute to the research on the lagoon.

Participation as a tool for the active management of the lagoon

LIFE VIMINE carries out several activities to involve the local population and the other *stakeholders*, both in the monitoring and maintenance works in the lagoon and in actions aimed to develop a sound local economy which also respects the fragility of the lagoon. The keyword is *participation*: the people who live the lagoon daily know its qualities, fragilities and needs, and therefore can make an important contribution to its management.

The most diverse stakeholders have been involved in the project: citizens and local institutions, associations, the world of boating, business associations and local businesses, fishermen, environmentalists, hunters, researchers, etc. Just in the first three years of the project, tens of meetings have been held involving hundreds of people.

THE LOCAL COMMUNITY PROTAGONIST OF THE MANAGEMENT OF THE NORTHERN LAGOON

Participation allows LIFE VIMINE to understand the thousands facets of the lagoon area and to educate people to visit the lagoon responsibly. Moreover it allows to create a network of actors sharing a common interest in the lagoon protection but with different knowledge and perspectives, that are joined to find and implement *together* management solutions which are shared and, thus, truly sustainable.

Examples? The choice of the eroding salt marsh edges to be protected was made together with the fishermen and citizens of the islands, who have a deep knowledge of the lagoon and who also suggested manners to optimize the soil-bioengineering works. The project joined forces with environmentalist associations to organise clean-up days to remove litter found on salt marshes. To constantly monitor the erosion of salt marshes, the project takes advantage of the voluntary collaboration of all those who frequent the lagoon. As described in the next pages, boat owners and tourism-related businesses have been involved in the identification of respectful ways of visiting the lagoon.

Inspection together with residents in the lagoon to choose where and how to protect salt marshes

Participatory activities in the lagoon area

Moments of dialogue in Burano between the project staff and stakeholders

Participatory activities for sustainable tourism and boating

The lagoon of Venice is as fragile as charming. It represents a high quality tourist attraction which provides the whole area with economic benefits, but visiting has to be respectful in order to avoid damaging the environment and to prevent the island society from being destroyed by tourism, as happening in Venice. For this reason LIFE VIMINE aims to promote a sustainable tourism in the northern lagoon and to increase visitor's awareness of the importance of adopting a responsible behaviour which pays attention to the fragility of the lagoon area.

To raise boat owner's awareness of the issue of salt marsh erosion caused by the waves generated by too fast motor boats, the project has started a participatory process of dialogue and discussion with the stakeholders related to navigation in the lagoon (boat owners, nautical associations, dock managers, ...). This process led to the creation of the *Boater's Vademecum*, a short document distributed to the people who navigate in the lagoon.

To reduce speed, to respect the navigation routes, to avoid littering: these are some examples of good behaviour which we communicate to those who navigate in the lagoon, also reminding them, in any case, to use common sense and slow down every time that the waves generated by their boat cause disturbance or troubles.

Concurrently, LIFE VIMINE has involved the tourism-related businesses of the northern lagoon in promoting a tourism supply which is more respectful of the environment, traditions and peculiarities of the lagoon, based on the elaboration of the *Chart of the Sustainable Tourism in the Northern Lagoon of Venice* which allows the traveller to choose, out of the wide-ranging tourism supply, those businesses which aim to live, promote and protect the lagoon instead of exploiting it. Through the Chart, the project promotes and creates a network of local businesses which carry out sustainable tourism activities, i.e. which respect the lagoon environment and traditions by following specific criteria identified during a participated process involving the businesses themselves.

TOURISM IN THE LAGOON: THREAT OR RESOURCE?

Waves generated by too fast motor boats destroy the fragile salt marsh edges

Salt marsh edges eroded by waves generated by motor boats

LIFE VIMINE meets school

New ideas often take time and divulgation to be assimilated and the innovative integrated approach of LIFE VIMINE to landscape management is no exception. Divulgation is essential particularly among youngsters, who in the near future will be the adults whose actions will play a crucial role in the fate of our land. For this reason LIFE VIMINE aims to make youngsters more aware of the issues of lagoon safeguarding, making them (and consequently their families) understand that the lagoon is a treasure to preserve.

In a simple and creative way, through lectures, workshops, nursery rhymes and competitions of ideas, the curiosity of the youngsters and their wish to take care of the land where they live are stimulated. Under the coordination of the City of Venice - Observatory of the Lagoon and the Territory, several dissemination activities have been promoted in schools: training sessions for school teachers and nature field guides and operators, the contest for schools "Let's save the salt marshes!" and more than 300 meetings with classes involving about 6000 students of primary and secondary schools of the lagoon area.

To reach also those who could not attend a meeting, an educational kit was created, including the *Educational book for the protection of the lagoon and the salt marshes* as well as a folding map of the lagoon, and distributed to 900 classes in the Municipalities of Venice and Quarto d'Altino. The book contains information on the lagoon ecosystem, erosion and the protection works of LIFE VIMINE, in addition to other specific educational materials and laboratory and play activities tailor-made for the youngsters. The Educational book and map are downloadable from the Documents section of www.lifevimine.eu.

A WELL INFORMED CHILD WILL BE AN AWARE ADULT

The students of a secondary school of Mestre in the salt marshes of Campalto, during a collaboration between LIFE VIMINE and the project WHY

Children create small fascines during an educational workshop

The assessment of the economic and social sustainability of the integrated approach

LIFE VIMINE will be successful if it is able to sustain the proposed integrated approach, ensuring the prevention of erosion also in the future. To do this, LIFE VIMINE aims to demonstrate that protecting the salt marshes is not only a moral duty but also an investment that creates benefits much higher than costs. In other words, the project confronts erosion also at the socio-economic level.

The costs are minimum because the protection works carried out in LIFE VIMINE are preventive, of small size, and constructed only in strategic spots through semi-manual labour and recycled local materials. Instead, the social and economic benefits generated by the conservation of salt marshes through an integrated approach are many: new local jobs in soil-bioengineering; new economic activities such as the local supply chain of wooden materials; the protection of salt marsh-depending businesses, which are those economic activities that would not exist without the salt marshes such as eco-tourism and artisanal fisheries; the conservation of the benefits provided by salt marshes, which support the presence of fishery resources, sequester carbon dioxide, clean the lagoon water from pollutants, damp the waves that otherwise would damage the piers and the island banks, ...

The costs and benefits of the integrated approach will be assessed, also in monetary terms, and communicated to the institutions that manage the lagoon, which will thus have a tool to decide how to invest to protect the salt marshes in the future.

But LIFE VIMINE acts also in a bottom-up fashion: by clarifying that there is a mutual benefit for local development and salt marsh protection, the project aims to motivate local communities and stakeholders, who benefit from salt marsh conservation, to request higher investments in the protection of the lagoon. Only by involving all those people visiting and living the lagoon, who are interested parties, it will be possible to recreate that balance between society and environment which has made the lagoon of Venice a unique place in the world and which will allow to save the salt marshes.

IT WILL BE POSSIBILE TO STOP EROSION ONLY IF THE MUTUAL BENEFIT OF SALT MARSH PROTECTION AND LOCAL DEVELOPMENT IS HIGHLIGHTED

Project workers in the lagoon. Author: Renato Greco - Videocommunication Service, City of Venice

A break from the LIFE VIMINE works in the lagoon

THE NUMBERS OF THE PROJECT

95 HECTARS OF PROTECTED SALT MARSHES

258 HECTARES OF PROTECTED TIDAL FLATS

4000 FASCINES MADE WITH LOCAL WOOD AND PLACED IN THE LAGOON

35-40 CM FASCINE DIAMETER

11000 POLES MADE WITH LOCAL WOOD AND PLANTED IN THE LAGOON

1500
M^2
NOURISHED
WITH SEDIMENT

1480
PERSON DAYS
OF LOCAL
WORKFORCE

60
M^3
OF LITTER REMOVED
FROM THE LAGOON

22
LOCAL BUSINESSES
INVOLVED IN THE CHART
OF SUSTAINABLE TOURISM

20000
STUDENTS
REACHED

What can you do?

Everyone can contribute to a better management of the northern lagoon. If you live or work in the lagoon, but also if you visit it only occasionally, you can play an active role in salt marsh protection. How? By reporting critical situations requiring action (for example, presence of litter or eroding salt marsh edges) or telling us about places of special beauty or value for nature to be protected and promoted.

To send us a report, just visit the digital platform *lifevimine.crowdmap.com* (app version also available) and follow the instructions. We have created it to make voluntary and participatory lagoon monitoring possible. Through this platform, everyone can send us reports in real time! The LIFE VIMINE staff will review and publish the collected reports, thus creating an online space where everyone becomes active protagonist of the lagoon monitoring. The reports are forwarded to the institutions in charge of the lagoon management, so that they can act in those cases deemed to be of priority.

But there is more: on **www.lifevimine.eu** you can find news, documents and other project products to download, you can register to our **newsletter** and you can find the link to our **social and interactive channels** (Facebook, Youtube, Flickr, Panoramio).

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