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TOWARDS A

ZERO-IMPACT ISLAND





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White paper for a sustainable management of the small Mediterranean islands



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Abbreviations and acronyms

Abbreviation	Meaning
ADEME	Agence de l'Environnement et de la Maîtrise de l'Énergie (the French Environment and Energy Management Agency)
CCBI	Communauté de Communes de Belle-Ile-en-mer (the community of municipalities of Belle-Ile-en-mer)
CHR	Cafés, Hotels, Restaurants
CRPM	Conference of Peripheral Maritime Regions (of Europe)
FFEM	Fonds Français pour l'Environnement Mondial (French Facility for Global Environment)
GHG	Greenhouse gases
ISOS	Isole Sostenibile (Italian for sustainable islands)
LED	Light emitting diode
MTES	Ministère de la Transition écologique et solidaire (Ministry for the Ecological and Inclusive Transition of France)
SDG	Sustainable Development Goals
REU	Reuse of Waste Water
SMILO	Small Island Organisation
UNESCO	United Nations Education, Science and Culture Organization

DOCUMENT EXCERPT

White paper entitled "*Vers une île zéro impact*" (towards a zero-impact island), Interreg France–Italy Maritime project 2014-2020 "ISOS" (CUP no.: I46J17000050007), 2020.

DRAFTING OF THE DOCUMENT

This White Paper has been developed as part of the project entitled "ISole Sostenibili: Network of islands for the sustainable development and preservation of heritage" (ISOS), supported by the Interreg France–Italy Maritime programme 2014-2020 (CUP no.: I46J17000050007), concomitantly with the White Paper entitled "*Preserve and promote island heritage*".

These documents have been drawn up under the coordination of the Var department, in its capacity as project leader, of the Conservatoire du Littoral and the SMILO association, and *with the support of Laurent Boutot from the ORÉADE-BRÈCHE firm.*

They set out to draw up an inventory of the requirements specific to small islands wishing to take the environmental and heritage-related concerns more into account in their management, and to make specific recommendations to policy makers, financial funders, businesses, researchers and local stakeholders (national, European and international) with a view to improving practices and trending towards the sustainability of their territories.

These white papers have been conceived on the basis of the thinking and work undertaken since 2015 as part of the SMILO programme and the ISOS project (technical workshops, good practice fact sheets, etc.). There were exchanges of views on the recommendations made for each of the target audiences with the representatives of the ISOS/SMILO islands, on the occasion of a dedicated work session during the annual SMILO conference in Porquerolles in 2019.

The French versions of the white papers have been translated into Italian and English.



INTRODUCTION





The ISOS project

The Isole Sostenibili (ISOS) project sets out to encourage integrated territorial approaches to the preservation of resources and the showcasing of the natural and cultural heritage of the small islands. It is co-funded by the Interreg France-Italy Maritime programme 2014-2020.

Small islands are singular territories whose heritage is unique. In the Mediterranean basin, they are now under threat, as they are confronted with high tourist attendance, and more than any other territories they are subjected to global changes (exceptional weather events, deterioration of landscapes and housing, pollution, overexploitation, etc.). While they share common challenges at international level, they also share solutions: they are marvellous laboratories for technical and social innovation that deserve to be capitalized on, enhanced and shared.

The ISOS project thus intends to create a network of French and Italian pilot islands that undertake to preserve their richness on a lasting basis. These exchanges of experience will federate the various stakeholders involved in the protection of the islands around shared objectives and will guide them towards innovative solutions for managing resources (water, energy, waste), for preserving and promoting their natural heritage (landscapes and biodiversity) and cultural heritage (tangible and intangible). Sustainable strategies for protecting these micro-territories for the benefit of their island populations will be jointly developed thanks to technical workshops, conferences, the mobilization of experts in the field, exchanges of information between peers and local investments. The ISOS project fits in with the approach led by

SMILO (Small Island Organisation), a partner of GLISPA (Global Islands Partnership), a key player, more particularly in the “Small Islands” group, in negotiations further to implementation of the Paris Agreement on climate change. Foundations and other public financiers are associated with this Programme, including the French Facility for Global Environment (FFEM), the Prince Albert II of Monaco Foundation, or even the Ministry for the Ecological and Inclusive Transition of France (MTES).

The SMILO quality certification process

The “Small Sustainable Islands” programme, initiated by the Conservatoire of the coast (France) and now led by SMILO, aims to partner islands smaller than 150 square km towards sustainable management of their territory. Centred around shared governance, the SMILO approach aims to guarantee the ecological and environmental state of an island, conducive to its human development. It supports the integrated management of islands on issues such as water and sanitation, waste, energy, biodiversity, landscapes and heritage. Local processes and sustainable practices are recognized by awarding the international “Sustainable Island” label.

This approach is a process of improvement of the sustainable development of a territory, and each island applying for this label must complete the following steps:

- Set up shared governance structured around an Island Committee;
- Collectively carry out a territorial diagnosis of the island according to the methodology developed by SMILO;
- Draw up and jointly approve the island's strategic plan;

- On the basis of this strategic plan, implement operations enabling it to achieve these primary objectives, in order to improve its sustainability and obtain the Sustainable Island label;
- Actively contribute to the life of the SMILO international network.

Since 2018, several islands (including 4 ISOS pilot islands: **Porquerolles**, **Saint Honorat**, **Sainte Marguerite** and **Tavolara**) have been awarded Label in progress recognition, as well as sector-specific prizes recognizing the efforts made in matters of water, waste, energy, landscape and biodiversity.



THE SMILO QUALITY CERTIFICATION PROCESS



Source : SMILO

MEMBERS OF THE SMILO ISLAND COMMITTEE

The Island Committee, the cornerstone of SMILO quality certification, brings together the island's key stakeholders and plans the sustainable development of their onshore and offshore environments around a common and shared vision. It is the permanent body that liaises with SMILO's secretariat.

The Committee's members at the very least include:

- A representative of a local public institution;
- One or more representatives of the local communities;
- A representative of a locally-based association;
- A representative of the territory's administrators and/or administrators of protected areas where applicable;
- A representative of the island's main economic sectors (farming, fishing, hotels and restaurants, handicrafts, etc.).

Source : SMILO



The strategic SMILO principles that form a common base for a shared vision of the future of island territories that are members of the SMILO network are translated into strategic orientations and theme-based orientations¹.

The SMILO programme includes nano-islands and islands having a significant surface area, inhabited islands and islands that are relatively densely inhabited, state properties and private properties, farmland/pasture land and arid land, isolated islands or islands that are part of an archipelago,

etc. These considerable differences and this diversity are fundamental to the richness of the SMILO network.

The annual tourist attendance figures are the current average figures. This table clearly shows the very significant differences between desert or quasi-desert islands like **Lavezzi**, **Asinara** and **Tavolara** and the large villages of San Pietro and **Maddalena** (6,300 inhabitants), and between islands "having an average tourist attendance" like **Port-Cros** and **Capraia** on the one hand and

¹ http://www.smilo-program.org/images/2-Label/principe_strat%C3%A9giques/A_PRINCIPES_STRATEGIQUES.pdf

SOME SOCIAL AND GEOGRAPHICAL CHARACTERISTICS OF THE ISOS TERRITORIES

Country/territory	Land area (km ²)	Permanent inhabitants	Tourists per annum
France			
Lavezzi	0,6	0	250 000
Sainte-Marguerite	2,1	20	200 000
Saint Honorat	0,4	20	105 000
Port-Cros	7	30	30 000
Porquerolles	12,5	200	1 000 000
Levant	9	80	55 000
Italie			
Asinara	51	1	80 000
Capraia	19,0	250	30 000
Palmaria	6,5	28	77 000
Maddalena	52,0	6300	170 000
Tavolara	5	20	72 000

islands “with very high tourist attendance” like **Porquerolles** or the **Lavezzi** islands on the other. The islands' situations also vary in other ways: link with and distance from the continent, the influence of a neighbouring metropolis (such as Cannes, with its 74,000 permanent inhabitants, its festival and its high summer attendance).

Towards a zero-impact island

The **environmental impact** concept refers to all the qualitative, quantitative and functional modifications of the environment (whether negative or positive) caused by a project, process, method, one or more organizations and one or more products, from their design stage to their “end of life”². These impacts affect our physical environment (air, water, soil and subsoil, etc.) and living beings (species – including mankind and human health – and ecosystems).

The notion of **“zero impact”** island is highlighted by the ISOS project as a goal to aim for. This is because all human processes (production, construction, transport, etc.), even virtuous ones, involve the use of some raw materials and energy, and they produce waste, even after several recycling operations. The project's ambition is therefore to identify possible ways forward to reduce the environmental impact of human activities on small islands as much as possible, all the more so as the environment of small islands is both rich and vulnerable. It is worth noting that several territories and companies around the world have initiated ambitious “zero waste”³ policies. So why not the ISOS small islands?

This prospect of limiting environmental impacts is for these islands a question of **sustainability** (a key notion for the SMILO programme and the ISOS project). The term sustainability here is understood as matching the definition of sustainable development given for the first time in 1987 by the Brundtland report⁴, namely, the search for a development method that satisfies the needs

² ADEME, December 2018 • <https://www.ademe.fr/expertises/consommer-autrement/elements-contexte/impacts-environnementaux>

³ Makers, June 2017 • <https://www.makery.info/2017/06/13/kamikatsu-le-village-japonais-a-presque-zero-dechet/>

⁴ “Our common future” report, drafted in 1987 by the United Nation's World Commission on Environment and Development, chaired by Norwegian Gro Harlem Brundtland

of current generations without jeopardizing the chances for future generations of satisfying theirs.

Despite their great vulnerability to the impacts of human activity (especially those caused by climate change), small islands have everything they need to become genuine experimental territories for constructing and implementing original and innovative green and energy transition strategies.



This White Paper entitled “Towards a zero impact island” aims to contribute to a better identification of the specific environmental needs (waste, water and sanitation, energy and light pollution) of small islands and the technical, regulatory, financial and other constraints they face in their search for solutions. The ISOS project, which inspired this white paper, seeks to contribute in this manner to the European Parliament's wish, supported by the CPMR's Islands Commission, which in its Corfu declaration of March 2019 “(...) asks the European Commission to present a White Paper on the development of the islands, based on existing good practices and involving the public governments of the islands”⁵.

It is thus aimed at several categories of readers, each one at its level having importance in the processes of improving the acknowledgement of the environment, sustainable development and heritage on the small islands:

- European and national policy makers;
- Financial funders;
- Researchers, businesses and innovative start-ups;
- The local stakeholders of these islands.

The main conclusions and recommendations of these White Papers could thus be borne by the partners of the ISOS project and SMILo in their respective networks and in their dealings with local, regional, national and European authorities and international institutions (Regional Seas Conventions), so that the islands can position themselves as pioneers in achieving the Sustainable Development Goals (SDG) adopted by the United Nations.

⁵CRPM, Corfu (Ionian Islands, Greece), 21 March 2019. Final declaration adopted by the CPMR Islands Commission





TEXAS

WASTE





Garbage islands?

Waste management is a very important challenge on the islands, whether or not they are inhabited, “village” or “natural” islands, protected or not, close to the coast or on the contrary far from the continent.

In most cases they have to contend with very significant seasonal variations in the volume of waste. Visitors are attracted by the biodiversity and rich historical heritage of the islands, and tourism now represents the biggest source of waste in the high season. The commercial, artisanal and fishing activities of the islands also produce waste.

Furthermore, islands in the Mediterranean suffer pollution caused by poor management of waste by the countries in the region. In its recent report published on 5 March 2019⁶, the WWF revealed that 600,000 tonnes of plastic produced by 22 countries bordering the Mediterranean end up in the sea every year, and this phenomenon is getting worse from year to year.

As a result, a vast amount of material, mainly plastic, of very diverse composition and non-recyclable⁷ is carried by the sea currents onto the beaches, with the attendant problems (aesthetic nuisance, more waste management at greater cost, contamination of marine ecosystems, transport of organic pathogens, etc.). About this very extensive pollution (the Mediterranean represents only 1% of the world's waters but 7% of all the planet's microplastics), the WWF⁸ states among other things that tourism is highly responsible for it (a 40% increase in marine waste in the Mediterranean in the summer), and that Italy (90 tonnes/day) and France (66 tonnes/day) respectively rank 3rd and 5th in the ranking of plastic-polluting countries in the Mediterranean sea.

The islands must therefore tackle the management of this waste, whether it is dumped on land or comes from the sea, despite the many constraints specific to insular environments and contexts. Now these difficulties must be recognized in order to tackle the sustainable management of waste, and cannot be resolved without the combined action of the authorities – local, national and European – and private-sector players – businesses and associations – and the involvement of citizens, be they islanders or tourists.

The main issues and future prospects



The main issues identified for waste management on small islands are:

- Limiting the amount of waste brought to the island;
- Reducing the quantity of waste produced;
- Deploying and/or consolidating selective waste collection;
- Limiting the cost of transporting waste;
- Improving the management of waste, developing its re-use and recycling;
- Establishing local governance of waste.

⁶ WWF. Press release, 7 June 2019. • <https://www.wwf.fr/vous-informer/actualites/chaque-annee-600-000-tonnes-de-plastique-sont-rejetees-dans-la-mer-mediterranee>

⁷ France Bleu, 21 May 2019. An island of plastic waste drifting off the coast of Corsica • <https://www.francebleu.fr/infos/climat-environnement/une-ile-de-plastiques-au-large-de-la-corse-1558416775>

⁸ WWF, Plastic pollution in the Mediterranean Let's avoid the trap! 2018 https://www.wwf.fr/sites/default/files/doc-2018-06/180608_rapport_plastiques_mediterranee.pdf



ISSUE 1

Limiting the amount of waste brought to the island

Under great pressure...

A great deal of waste is imported onto the islands. This is particularly the case for waste produced by incoming tourists. In the example of ISOS project islands, the influx ranges from 13,000 (San Pietro, Italy) to 1,000,000 (**Porquerolles**) tourists a year, so this is a very serious issue. Waste has a cost, for its collection, transport (generally transferred to the continent) and treatment. And this cost increases for islands further away from the continent. One of the key issues facing the islands is limiting the arrival of waste in order to reduce or even eliminate the cost of managing it.

And potential solutions...

Natural islands generally rely on **raising tourist awareness** when they board the shuttles taking them to their destinations (a video automatically screened on the boats; communication campaign, etc.). This type of initiative aims to make tourists environmentally responsible, mindful and aware of the issues and difficulties that insular environments face. These simple measures are easier to take for tourists on day trips than on inhabited islands, which have waste collection infrastructure and where they could nonetheless be encouraged. In particular, on **Saint Honorat** (Cannes, France), Lérins Abbey (the island's owner) removed all the

waste bins on the island in 2019 and ran awareness campaigns aimed at visitors urging them to take their waste back with them to the continent.

How to reduce other types of waste, not least the waste relating to tourist activities? In part it is a matter of **convincing restaurant owners and tourist professionals** to limit the use of packaged products and single-use plastic, as prohibited now under the European directive of 5 June 2019¹⁰, and urging them to take back all their waste and to use reusable products (e.g. crates, compostable products, etc.), as is done for instance on the **Hyères Islands** (France, see box on the next page).

Bulk trading is developing nowadays, and many suppliers have gone along with it. Platforms like the Réseau Vrac (reseauvrac.org) in France support retailers and refer them to vendors of products in bulk.



The growing pollution by waste and the growing cost of treatment is inseparable from the rapid and insufficiently controlled growth of tourist attendance on small islands. The amount of waste brought onto the islands can only be limited by running active awareness-raising campaigns aimed at all parties concerned.

⁹ ADEME, 29 November 2017. *Waste prevention: what you need to know* • <https://www.ademe.fr/en/expertises/dechets/passer-a-l'action/eviter-production-dechets/dossier/prevention/prevention-dechets-qui-l-faut-savoir>

¹⁰ Directive of 5 June 2019 on the reduction of the impact of certain plastic products on the environment • <https://eur-lex.europa.eu/legal-content/FR/TXT/HTML/?uri=CELEX:32019L0904&from=FR>



ISSUE 2

Reducing the quantity of waste produced

The regulations to rely on...

Reduction is also prevention. European and national regulations are gradually including ambitions in terms of recycling.

For instance, the French law for energy transition and green growth (LTECV) of 2016 set a national target of recycling 55% of non-hazardous and comparable waste by 2020 and 65% by 2025. Furthermore, 10% of household and comparable waste must be reduced within 2020¹¹.

Very recently, a French bill on waste prevention for the circular economy (tabled on 10 July 2019) aims to change consumer patterns and put an end to wastefulness, reduce waste, fight plastic pollution (with a target of recycling 100% of plastic by 2025) and improving consumer information. A roadmap lists all the operations involved in the transition to a circular economy model and presents 50 measures targeting different scales of action¹².



¹¹ MTES, July 2016. The law for energy transition and green growth.

¹² MTES, 2019, 50 measures for a 100% circular economy • <https://www.ecologique-solidaire.gouv.fr/sites/default/files/Feuille-de-route-Economie-circulaire-50-mesures-pour-economie-100-circulaire.pdf>



Waste reduction on the Hyères Islands

In 2018 the three Hyères islands (Porquerolles, Port-Cros and Levant Island) started considering ways of limiting the amount of waste brought onto their islands. The approach aims among other things to optimize the choice of supplies and to change the behaviour of professionals, so as to reduce the volume of waste and thereby limit its cost.

The fact is that these three islands produce only 5.2% of the annual tonnage of waste of the town of Hyères, but represent more than 20% of the town's annual collection budget.

Several measures are promoted or envisaged:

- Reintroduction of a deposit system (e.g. beer barrels.);
- Unpacking bulky orders on the continent (e.g. cardboard packs for the renewal of the fleet of bicycles of the Porquerolles hire companies, representing more than 1,000 bicycles a year);
- Investment in systems offering an alternative to plastic bottles: Water fountains, individual water filters, which cost €1,200 to install, the equivalent of 4 pallets of mineral water, namely 2,000 bottles;
- Introducing a charter of good practices/management in the yachting sector, like the "Bateau Bleu" label;
- Re-using waste as part of a circular economy process (e.g. a green waste management study on the island of Levant, recovery of bio-waste such as edible oils for tourist islands).

source: SMILO - <http://www.smilo-program.org>



Composting organic waste

In order to meet national and international targets, one solution for reducing the volumes of waste is the composting of household waste, the organic waste of restaurants and green waste..

Limitations...

In order to cost the percentage of waste that could be composted and assess the effectiveness of such a measure in the context of the islands, it is important that **studies are carried out on the characterization of waste**¹³. At present we know very little about the sources of waste, and this is hampering preventive measures like installing appropriate waste treatment and recovery facilities.

To promote the use of certain types of waste, changes should also be made to the relevant regulations. For instance, the possibility of using certain types of compost (currently very limited) is hampered by the lack of a European regulation on organic waste. The same holds for the possibility of using biodiesel.

¹³ ADEME's CARADEM Guide on running household waste characterization campaigns • <https://www.sinoe.org/pageencapsule/index/lid/Doc/1182>

And potential solutions...

On the island of **Belle-Île-en-mer** (France), the volume of its inhabitants' waste bins has been reduced fourfold thanks to composting, sorting and the abandonment of disposable products. Support for individual composting on the island has been provided by the community of municipalities since 2016. **Household waste** is not the only type of waste with high potential for reduction. **Green waste**, which is also biodegradable, can easily be shredded and composted at little cost for a low residual volume. **Belle-Île-en-mer** has experimented with this: an electric crusher (for branches under 3.5 cm in diameter) is available

for its inhabitants on loan free of charge. The feedback was very positive; in the space of only 8 months (when it was brought into service after 2015), the crusher has been loaned more than 60 times. The community of municipalities of Belle-Île-en-mer (CCBI) has also made available a more powerful thermal crusher, which however requires group training (provided by a CCBI official) before it can be loaned.

The introduction of these types of simple and efficient prevention measures requires strong political support locally to coordinate projects and convince those concerned to commit to them.

The plastic issue



Pressure...

The issue of plastic waste is twofold: on the one hand, one needs to manage the plastic waste used and left on the islands, and on the other, solutions must be found for plastic waste washed up on the beaches.

Although the islands can hardly reduce seaborne waste, they can nonetheless prevent plastic brought in by tourists, inhabitants and businesses, not least by raising awareness and providing information (often already partly in place).

Potential solutions and exemplary approaches...

Strong measures aimed at fighting plastic pollution are underway for instance on the **Island of Principe** (Portugal, see box below). The authorities have planned to ban the import of plastic bottles by 2020.

Such measures aimed at limiting or even banning the use of plastic in all economic sector on small islands depend to a large extent on the **willingness of the local authorities**.



Flasks against plastic in Principe

Principe is a Portuguese island in the South Atlantic Ocean. It has a population of 8,000 and a small influx of tourists (roughly 1,000 visitors a year). The island's authorities have developed the **Water Recycling** project, which aims to fight "plastic bottle" waste. It is more particularly organized around:

- The installation of 13 drinking water points in public spaces;
- A wide-ranging awareness campaign on the concept of re-use (for instance, urging people to re-use plastic bottles and bags);
- A scheme for collecting plastic bottles, with the mobilization of the government, schools and civil society;
- Several campaigns on the provision of coloured aluminium flasks, dubbed "biosphere bottles".

In exchange for their plastic, the inhabitants are given flasks (more than 600,000 plastic bottles have been collected and more than 7,000 flasks issued, with €50,000 of funding from UNESCO). The plastic bottles are stored then removed from the island. And the island of Principe has planned to totally ban the import of plastic by 2020, preferring glass and biosphere bottles.

Source : UNESCO



In this respect, the Local Household Waste Prevention Programme 2019-2024 of the **Island of Oléron** (France) claims that: *"This experience proves that waste prevention measures, when they constitute examples to follow, can only be effective if local stakeholders adopt them; financial measures, such as the Special Fee or Incentive Pricing (action 10 of the programme) are also effective ways of encouraging waste producers to reduce their waste."*

Regulatory support...

Such measures need to be supported by strong international and national regulations on reducing the production of plastics. Such regulations are essential to addressing the regional issue of seaborne waste in the Mediterranean. Some of them are already in place. The European directive of 5 June 2019¹⁴ bans the marketing of several

single-use plastic products, those that are most commonly found on the beaches and in the seas of Europe. From 3 July 2021, plastic straws, cutlery and plates, coffee stirrers, balloon stems or even cotton buds (...) will be banned in the EU¹⁵. Furthermore, *"Extended producer responsibility is also extended to fishing nets and fast-food containers. The manufacturers will bear the cost of separate collection and treatment of such waste". The measures imposed by this directive should be transposed at national level no later than 3 July 2021. Member States must also "determine their system of penalties imposed on producers who breach these measures."*

Some measures have already been transposed nationally or regionally. For instance, the **Balearic Islands** (Spain) adopted the law on waste and polluted soil in 2019¹⁶, which prioritizes waste

¹⁴ Directive of 5 June 2019 on the reduction of the impact of certain plastic products on the environment • <https://eur-lex.europa.eu/legal-content/FR/TXT/HTML/?uri=CELEX:32019L0904&from=FR>

¹⁵ <https://www.actu-environnement.com/ae/news/publication-directive-europe-produits-plastiques-interdiction-juillet-2021-33596.php4>

¹⁶ <https://www.zerowastefrance.org/lutte-pollution-plastique-baleares/> and Article of law: : <http://www.caib.es/eboibfront/ca/2019/10944/seccio-i-disposicions-generals/471>

reduction. This is an innovative law, as it is aimed at certain sectors producing a lot of waste, such as the cafés, hotels and restaurants sector. These sectors will have several obligations:

- From January 2021, single-use containers will be banned for meals taken in situ;
- By 2030, 40% of water packaging, 80% of beer packaging and 70% of cold drink packaging will have to be re-used;
- Furthermore, again with regard to this law, to encourage good practices, financial incentives will be applied when citizens, tourist professionals or tourists take initiatives to reduce their waste.



- ✓ The future is to prioritize waste prevention, re-use and recovery (e.g. composting), and selective sorting. These are simple, concrete high-impact measures that must go hand in hand with effective awareness-raising of the public on islands and on the continent.
- ✓ But in the long term, waste recovery is not the only rational and economic solution; avoidance should become a priority (changing consumer patterns) or failing which, converting waste at source.
- ✓ This is particularly true for plastics. Consumption of plastic really needs to be reduced. Otherwise, apart from visual pollution, the risk is seeing micro and nanoparticles of plastic increasingly invading our environment¹⁷ every day.
- ✓ Constantly increasing quantities of plastic are washed up on island beaches. These island suffer from mismanagement of such waste by the Mediterranean countries. Beyond means of action available to local stakeholders regarding consumption and the management of their waste, this major problem requires the support of governments and of Europe. Regulations are indeed evolving constructively, but slowly. Some of them need to be improved with a view to allowing the use of certain types of waste: compost, biodiesel, waste water, etc., or even limiting or impose a ban on the production of other types of waste, as is the case for single-use plastic.

¹⁷ Plastic waste: recycling is not the solution, Reporterre, June 2018 • <https://reporterre.net/Dechets-plastiques-le-recyclage-n-est-pas-la-solution>

FROM PRODUCTION TO STORAGE

Waste must be managed with due regard for the hierarchy of waste treatment methods defined in article 4 of directive 2008/98/EC of the European Parliament and of the Council (19/11/2008): namely re-use, then recycling, and avoid disposal.

Note: The question of managing biowaste and green waste is covered in the Prevention chapter.



ISSUE 3

Deploying and/or consolidating selective waste collection

The waste management cycle starts when preventive action fails to avoid waste production.

Constraints and limits specific to islands...

Collection is the first stage of waste management. This phase is crucial and its quality determines the rest of the cycle's phases. While a selective collection scheme is essential, **waste collection is a real challenge for small islands**. The question of their accessibility is still central, namely their dependency on maritime transport and mild weather conditions, whether or not they are permanently inhabited.

Islands must step up selective waste collection to limit shipments of unsorted waste to the continent. Currently, the islands are aware of the progress they need to make to achieve a selective sorting percentage that meets national requirements and targets that were set when selective collection was introduced¹⁸.

Effective collection must go hand in hand with effective awareness-raising of the public on islands, their inhabitants, retailers and tourists. The latter, as they are away from home, can forget good environmental practices, such as selective sorting or taking their waste with them after an outing in the countryside. So effective measures must be introduced or reinforced here too (signage) to remind tourists of these good practices.

A lack of awareness-raising measures is not the only curb on the effectiveness of the sorting system. The islands suffer from a **lack of financial means** and a lack of **space** for storage and organization. This is compounded **by the need for services and labour** that are not necessarily available on the islands. With a **small number of residents**, there can also be a threshold effect, a threshold below which not enough waste is produced to warrant selective sorting. These difficulties penalize not just selective collection but also the following stages of waste management: re-use, recycling/recovery and disposal.

Potential solutions and good practices...

Among the islands on the ISOS programme, the **island of Maddalena** (Italy) has for instance decided to raise its selective sorting rate to 80% in 2020 (which was 69% in 2018). The **island of Capraia** (Italy) has planned to rehabilitate and improve its collection centre. **Tavolara island** (Italy) has planned the construction of an eco-centre to differentiate waste streams and promote recycling.

Original experiences show that environmentally-friendly waste collection systems can be put in place to improve the quality of selective sorting (see the example of the "hippomobile" in the box below).

¹⁸ The European regulation sets a recycling target of 60% by 2030 for municipal waste (55% by 2025 and 65% by 2035) and 70% for packaging (lower European recycling targets have been set compared with the initial targets of 2014). Source : <https://www.actu-environnement.com/ael/news/nouveaux-objectifs-recyclage-2030-europe-31502.php4>.



Horses used to collect household waste in Pont-Sainte-Marie (Aube)

Aims Offer a green and economical alternative to collection by lorry

Principles 70 towns in France, including Pont-Sainte-Marie, have adopted this household waste collection method. Draught horses from the Ardennes, trained to render this service, can tow up to three times their weight and collect 8 tonnes of waste a day, namely as much as a lorry, and cost no more than a lorry. An exemplary scheme that among other things reduces the carbon footprint of municipalities. The hippomobile is a modern and lightweight cart specifically constructed for this activity. It is towed by a horse, the driver of which is put at the disposal of the town, and accompanied by a municipal employee.

Results

- A 35% reduction in GHG;
- Better sorting;
- Savings;
- A new opening for the breeding of draught horses.



Source: Acts of the SMILO Bonifacio workshop, 2018

Lastly, several avenues should be explored to boost the financial means of the islands (e.g. the Barnier Act in France). One of these is the introduction

of a tourist environmental levy (in particular on maritime crossings to help finance sustainable management projects/plans).



- ✓ Despite the many constraints concerning the insularity of selective collection of waste on the islands, potential solutions exist and still need to be tried out.
- ✓ To achieve a greater degree of autonomy, reduce their dependence on the continent and the cost of waste treatment, it is important that each island draws up a comprehensive strategy for determining its planning and its long-term public investments.



ISSUE 4 Limiting the cost of transporting waste

A serious constraint...

Among the additional costs relating to insularity, the high cost of transport and seasonality for islands is highlighted in a 2018 document concerning the **Ponant Islands**¹⁹ (France): “[...] some of the island's additional costs result from problems [...] of waste.[...] **Additional costs concern both investments and operating expenditure. An additional cost of 38%²⁰ compared with the continent is observed due to transport conditions and expenses. Transporting goods by sea generates additional costs that are quickly passed on to retail prices. There are also additional**

costs due to seasonality. Like coastal municipalities on the continent, islands must manage very large seasonal populations, which forces them to over-dimension their infrastructure. Whereas municipalities on the continent can pool their facilities, islands are forced to invest individually to equip themselves. ”

Few specific solutions,

apart from reducing the volume of waste to ship (see Issue 2).



High additional costs compared with the continent are constraints on island that are difficult to mitigate, apart from decreasing the amount of waste to be transported.

TREATMENT, DISPOSAL AND RECOVERY



ISSUE 5 Improving the management of waste, developing its re-use and recycling

Needs...

The subject of developing composting was covered in the chapter on issue 2 on the reduction of produced waste, but the question of re-use and recycling, which very directly help reduce the amount of waste to process (and thus the amount of waste that islands ship to the continent) also concerns other types of waste.

With regard to their many constraints, the islands **need recycling and recovery facilities** matching their treating capacity and the seasonal variation in waste streams matching the volumes of waste processed, and consuming little electricity. As current techniques are ill-suited to treating the small amounts generated on the islands, **research and development operations**, which

¹⁹ Ponant Islands, 2018. *Essentiel 2018*. Link: https://www.iles-du-ponant.com/wp-content/uploads/_Documenter/Missions_chiffres_cles/AIP-essentiel-2018-WEB.pdf

²⁰ *Studies on the additional costs of islands. Ressources Consultants Finances (2015)*

are currently lacking, are needed in order to propose potential solutions likely to address the distinctive features of the islands.

A distressing observation...

Certain islands face the issue of waste in the form of open-air faeces (third category of waste, after tourist rubbish and seaborne rubbish): urinating, defecation, toilet paper, sanitary towels, tampons, etc.

Avenues to explore...

Albeit not an opportunity specific to islands, so-called “conventional” waste recycling and recovery facilities can go hand in hand with the cultural and economical life of the islands. The possibility of developing **artistic and artisanal reclamation activities** based on recycled waste

is now a worldwide reality, known as upcycling: making jewellery from glass, clothes and various cloth items, plastic offcuts, etc., the added value of which can at times represent more than an income supplement.

On the natural islands of **Lavezzi** (France), the lack of infrastructure is an issue: at present, there are no official “waste-hygiene” facilities (such as waste bins, containers, toilets) on the island, under the principle of non-development in natural areas. The SMILO project has identified various possible solutions: a toilet ship; a floating dock with toilets; a land-based collection system with maintenance teams (the land-based dry toilets solution cannot be contemplated in a nature reserve that is not intended to be developed).



- ✓ The islands need recycling and recovery facilities sized and operated in keeping with their constraints. Research and development work is needed if new solutions are to emerge.
- ✓ The islands are lands of innovation, but the technological solutions must factor in both their constraints and their advantages: small labour forces, particularly qualified labour forces, small surface area, limited energy resources... They should not create further constraints or accentuate existing difficulties.
- ✓ Resolving the issue of faecal waste will require new infrastructure, raising awareness among the populations and the introduction of stringent regulations. But this problem is harder to resolve for nature reserves, which cannot be developed.



WATER 6 **Establishing local governance of waste**

The governance of waste on small islands with few inhabitants and dependent on the continent is a real issue. Setting up local participative governance of waste management is important for involving the territory's various stakeholders: politicians, inhabitants, tourists, businesses and workers. As for the issues of water and energy, set targets for waste management can only be met with the participation of all the local stakeholders.





WATER





Issues having multiple root causes

The water management difficulties experienced on small islands (whether it be the mobilization of drinking water or wastewater treatment) have a variety of root causes.

They depend in the first instance on their geographical characteristics. The size of the islands, their topography, the geological composition of their subsoil or the extent of vegetation cover are just some of the factors that impact on the availability of water, conditioning the infiltration of surface run-off into the water table. Islands with little relief have small underground reserves and often experience problems of infiltration of seawater into the water tables. On mountainous islands, the water tables are larger, but the storage capacity for drinking water is still limited by the lack of space.

Their demographic characteristics (density and seasonal fluctuations in population) also have a direct influence on water supply and wastewater treatment requirements. And socioeconomic conditions and practices are at the root of problems: high tourist attendance, overconsumption of water, indiscriminate use of drinking water, pollution of watercourses and water tables by questionable farming, domestic and tourist practices, etc.

Lastly, climatic conditions are becoming increasingly meaningful as the effects of climate change are felt: variable rainfall according to island contexts, water tables at the mercy of tides and the rise of salt water levels, extreme meteorological events.

The islands' access to quality water is thus very irregular, and the main problem water management for small islands is their capacity to meet the basic needs of populations living or staying on the islands. This determines their tourist accommodation capacity and thus their economic development.

With regard to sanitation, waste water is often discharged into the sea untreated, often polluted by pathogens, chemicals, crop protection products, chemical fertilizers and hydrocarbons or used oil generating negative impacts both on the health of inhabitants and on fresh water and marine environments.

Furthermore, inasmuch as legislation is very restrictive, more particularly regarding the possibility of using recycled rainwater and waste water, the regulatory aspect conditions the limited capacity of islands to innovate in their use of water.

The fact is that achieving the self-reliance of islands must be prioritized, both for drinking water and for waste water. This can be achieved by working on two main areas: resource management and management of usage.

The main issues and future prospects

The main issues identified for water management on small islands are:

- Controlling consumption of resources and preventing wastefulness;
- Quantitative management of resources;
- Qualitative management of resources;
- Setting up water governance;
- Protecting the natural and human environment onshore and offshore;
- Encouraging new uses of waste water.



ISSUE 1

Controlling consumption of resources and preventing wastefulness

There are several ways of limiting the consumption of drinking water.

Defining requirements and monitoring

Effective management of water resources on an island requires regular evaluations of the quantity and quality of available fresh water resources, a characterization of the condition of the water distribution system, and a definition of the pressure on this resource according to different uses. This is true for any community, but all the more so for an island with limited resources.

Thorough knowledge of their water distribution system would help islands avoid wasting water due to management problems and/or leaks in the system, sources of waste of money and energy. Generally speaking, a complete survey of the water resources on islands is needed to draw up an action programme with clear objectives suited to the island's context and factoring in its constraints. Moreover, the actions taken can be evaluated by monitoring the quality and quantity of the resources.

This type of survey requires the support of public organizations (e.g. the water agencies in France), of the municipalities or the communities of municipalities.

Rational use of water and technologies for reducing consumption

Limiting water consumption more particularly depends on the adoption of good habits and eco-actions by consumers, and on the installation of water-saving appliances, for instance: in tourist homes and structures (water-saving devices), for alternative public toilets (dry toilets or the

equivalent), for agriculture (appropriate irrigation systems such as drip irrigation, spraying, etc.). But the adoption of thrifty behaviour and technologies requires guidance for those concerned and raising their awareness.

The importance of awareness-raising

“Currently each inhabitant in France uses an average of 148 litres a day (160 to 250 litres per person in Italy) (...). In other respects, French holidaymakers are less frugal, their average rising to 230 litres of water a day²¹.” According to the WHO, each individual needs 50 litres of water a day to live decently, and 100 litres a day to live comfortably. Above that level, we speak of wastefulness.

Nowadays, consumption by tourists often exceeds the procurement capacity of islands, which find themselves in difficult situations, causes of disputes between different users (inhabitants, farmers, etc.). Make tourists aware of their responsibilities is now an urgent matter. This in particular requires awareness campaigns on the rational use of water and everyday gestures aimed at reducing and optimizing consumption. Water-savings can be made both indoors (showers, carry out, etc.) and outdoors (saving drinking water in the garden²², etc.).

“Water Walks” were organized in the summer of 2016 on the **island of Santorin** in Greece to get both tourists and inhabitants to understand the issues of availability of fresh water, the role of water in the history of Santorin and water management practices.

²¹ Water information centre • <https://www.cieau.com/le-metier-de-leau/ressource-en-eau-eau-potable-eaux-usees/quels-sont-les-usages-domestiques-de-leau/>.

²² Example: putting the right plant in the right place, watering at the right time and in the right way • <http://arrosageeteconomiedeau.com/>

The role of tourists does not end there; in addition to being informed, they must become active participants in the sustainable management of water.

Example of initiatives: there are many documents encouraging people to take eco-actions (see an example in the **Ponant islands** in the box below).



Getting inhabitants and tourists to use water responsibly on the Ponant islands (France)

Principles For inhabitants: they are given a water-saving kit (one per household, costing 2 euros). The kit includes 3 water-saving devices (5 litres per minutes) for taps and 1 water-saving device for the shower (8 litres per minute).

For tourism stakeholders: an awareness-raising kit aimed at visitors on eco-actions and the island's particular water and ecological situation. This kit includes 1 educational thermometer and educational stickers to stick up in strategic water usage places.

Results

For a family of 4, one water-saving kit saves an average of 43 cubic metres of water, 633 kg of carbon dioxide and 2,236 kWh (the energy needed to heat water) a year, namely 272 euros.



Source : Press pack, get set! 13 piles organize themselves to preserve water resources. Houat, 20 April 2018.



More frugal usage of water resources remains a major issue. An important resource of fresh water thus needs to be found in economizing its usage. Going down this route requires mobilizing old techniques, supporting and adopting new technologies, raising the awareness of the population regarding the right gestures (tourists in particular), and introducing financial incentives and regulatory obligations.



ISSUE 2 Quantitative management of resources

Towards diversification of fresh water supplies: resorting to alternative/ancestral methods

In order to better control and save drinking water, several techniques suited to islands have been tried and tested.

This is more particularly the case for those that improve the **infiltration of water into water tables**: hillside dams for run-off water, reforestation, banks of earth, agricultural terraces with low walls, excavating tunnels to facilitate refilling.

This is also the case for **collecting rainwater**. The advent of water distribution systems has made islanders forget ancestral rainwater usage techniques and habits²³.

Collection of rainwater is to be encouraged, in particular using traditional sustainable infrastructure wherever it exists (zones of precipitation on roofs for instance).

More modern installations also easily collect rainwater (see the Irish example in the box).

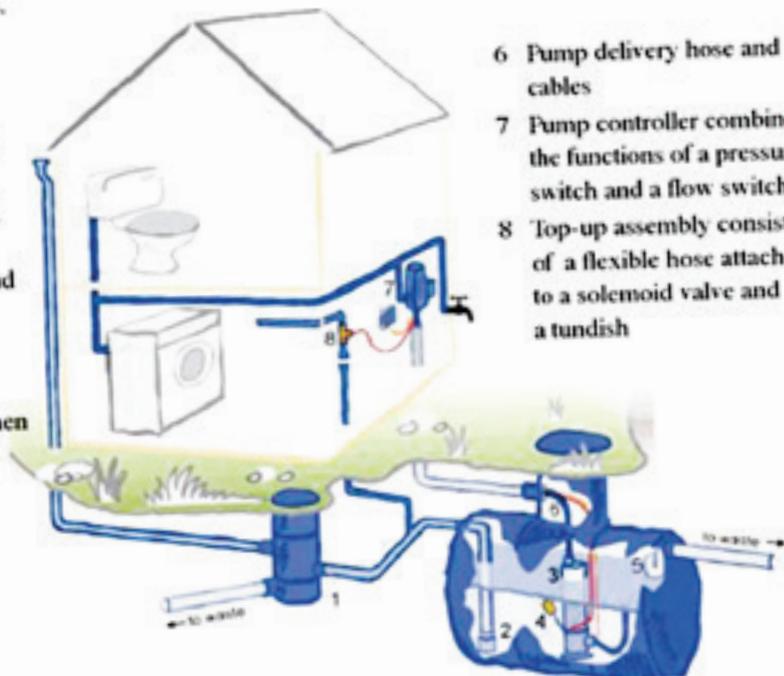
In France, from a regulatory point of view, the government order of 21 August 2008 regulating the reclamation of rainwater and standard EN1717 formally prohibit the use of rainwater for domestic use (cooking or drinking) or body hygiene. According to the law, rainwater can be freely used outdoors. Indoors it can be used for flushing toilets and washing floors and linen, subject to appropriate water treatment²⁴.



Rainwater reclamation in Ireland

How a typical system works, using a submersible pump and underground filter:

- 1 Water from gutters pass through filters removing organic matter
- 2 Water enters storage tank through a calmed inlet eliminating turbulence and disturbance to sediment and float switch
- 3 Pump
- 4 Float switch activates when the water level reaches a minimum
- 5 Overflow trap



- 6 Pump delivery hose and cables
- 7 Pump controller combines the functions of a pressure switch and a flow switch
- 8 Top-up assembly consists of a flexible hose attached to a solenoid valve and a tundish

Source: *The state of fresh water on the small islands of Europe*. Christian Pleijel – KTH, October 2017

²³ PLEIJEL C., KTH, 2017. *The state of fresh water on the small islands of Europe*

²⁴ <https://www.service-public.fr/particuliers/vosdroits/F31481>

On the basis of exemptions concerning **extended rainwater usage possibilities** granted to the **islands of Levant and Glénan** (France), and which are being studied for the **Lavezzi islands** (France) (for body hygiene in particular), extensions would need to be studied for better use of the limited water resources on the islands.

Depending on the particular situations of the islands, **courses of action other than** mobilizing rainwater exist to address the shortage of fresh water. These include:

- Capturing fog water deposits on nets in tropical environments;
- Using hydrothermal water in volcanic environments (also relating to the infiltration of rainwater);
- Another technology is the desalination by small units tailored to the size of the island, combined with renewable energies (such as reverse osmosis, etc.),

- Or even the recycling of waste water, more particularly for farming purposes (see the following chapter, which deals with waste water).

Reducing the environmental and economic impacts of the dependence on the continent

If and when the island's supply of fresh water from the continent cannot be avoided, the development of water transportation in large quantities (on barges with tanks or reusable containers or cans, etc.), which is then stored on the island in large-capacity tanks or fountains, will limit the consumption of bottled water, and thereby the unwarranted influx of plastic, and will make savings.



- ✓ Rainwater collection processes (traditional ones in particular) should be encouraged for outdoor uses.
- ✓ Regulatory limitations on certain uses of rainwater could do well to be adapted, following the example of exemptions granted to (or requested by) certain islands (in France: **Levant, Glénan, Lavezzi**).





ISSUE 3

Qualitative management of resources

The need for a multi-pronged approach

As is the case on the continent, but in a more compelling manner given the closed systems of the islands, the qualitative management of water involves joint actions of different types, in particular:

- **protecting catchment supply basins and water withdrawal areas**, by establishing regulatory perimeters, possibly physically demarcated and protected above ground, and socially recognized;
- **Developing sustainable water resource preservation initiatives**: limiting the use of pesticides and other synthetic products (for instance by encouraging organic farming); improving the collection and drainage of waste water; eliminating the burying of non-inert waste (illegal or legal dumping);
- **Raising user awareness** about the use of non-toxic products and non-pollutants for water tables, and conversely, avoiding the use of products likely to affect water tables and distribution systems.



Even more so than on the continent, the qualitative management of water on the islands requires the introduction of joint technical, regulatory and public awareness actions.



ISSUE 4

Potential solutions that have proved their worth ...

Potential solutions that have proved their worth...

Setting up local committees to discuss water management (such as river or bay committees, or the local water commission in France) facilitates information dissemination and dialogue, and thereby limits disputes between users of water. Creating dedicated tools, such as a “Water Fund”, is also a way of supporting actions in favour of better water management.

In addition, the authorities can **use regulations, invoicing and taxation** (see the example of the

island of Ithaka in Greece in the box below) as ways of promoting water savings.

Enacted **local regulations** offer for instance the possibility of imposing limited flow rates of drinking water for hotels, restaurants and households, or even more radically, of banning water usage at night or on certain days of the week. On the **island of Houat** in France, the land use plan approved in 2017 has instituted a number of such rules: limitation of soil density and soil sealing; the obligation to equip all new buildings with a rainwater tank, a ban on swimming pools and private well drilling, etc.²⁵

²⁵ Land use plan – presentation report. Houat Island, February 2017



Retrospective invoicing

Aim Promote water savings

Principles The municipality on the island of Ithaka in Greece (96 km² in the Ionian sea) has introduced reverse invoicing: the less water I use, the less I pay per cubic metre. The water bill is based on bands of cubic metres of water used over a period of 4 months and the type of infrastructure (dwellings, hotels, semi-professional premises, etc.). By way of example, a household using 0 to 40 cubic metres of water would pay 1 euro per cubic metre. Whereas a household using 121 to 160 cubic metres would pay 2 euros per cubic metre. Hotels are subject to the same regulation, but the prices are different. All-inclusive advantages are granted to establishments that actively implement water-saving initiatives (e.g. using rainwater, etc.).

Source : Water Saving Challenge - a smart guide to water management



- ✓ Setting up “water governance” by an ad hoc committee made up of the main users of water facilitates the implementation of a water management policy.
- ✓ Local regulations, invoicing and taxation can be effective tools for promoting water savings.

WASTE WATER



ISSUE 5 A need to renew drainage and wastewater treatment facilities ... with appropriate technologies

A need to renew drainage and wastewater treatment facilities ... with appropriate technologies

Many islands need **new or rehabilitated wastewater treatment facilities** (such as a micro-wastewater treatment plant) **and wastewater collector and sewerage systems** (including individual and collective septic tanks) in order to move waste water away from households, catchment basins and fragile land and marine ecosystems. Waste water must then be treated adequately, and discharge into the sea must be controlled. All these operations must be conducted

on the basis of in-depth studies characterizing (quantity, quality) the waste water and its negative impacts on the environment. Such operations very often require technical and financial support.

It is important for the islands to **use alternative technologies suited to their context**, such as phyto-purification (planted filters), lagooning and natural filtration (e.g. mangroves).

Another technology of the future, **biodigesters** treat waste water very effectively, but they require fairly high land use.



Planted reed filters, Vigueirat marsh (Camargue, France)

Aims Ecological wastewater treatment

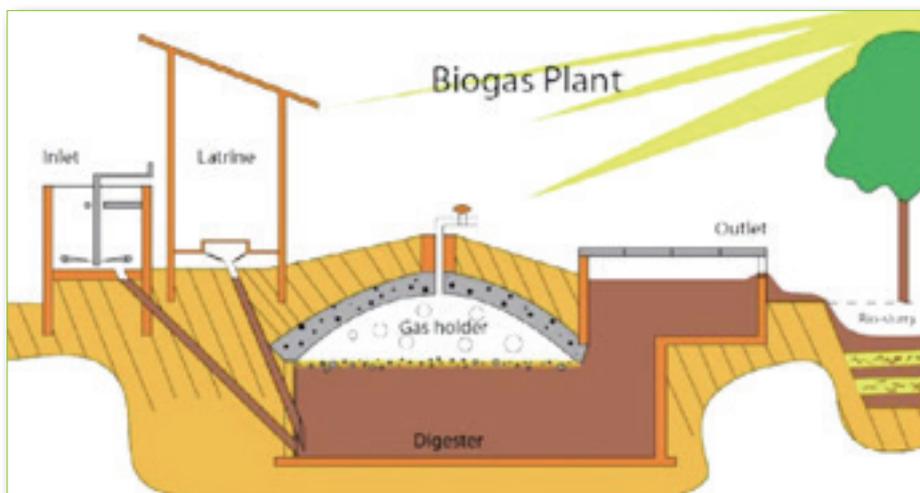
Principles

- The mechanical action of reeds oxygenates the surface sludge and avoids it clogging.
- The microorganisms that develop in the filtering medium biologically purify the water.
- The filtering medium is made up of successive layers of sand having different properties (washed round silica sand, river sand... having different grain sizes).
- This type of system requires maintenance, and precautions must be taken by the inhabitants (no discharge of sewage into the public sewers, no bleach). The efficiency of planted filters exceeds the minimum regulatory thresholds.



Results Planted filters are suitable for both low and high volumes, they require little technical expertise and are inexpensive to operate.

Source: SMILO • «<http://smilo-program.org/fr/ressources/fiches-bonnes-pratiques/fiche9>»



ANAEROBIC DIGESTOR (A BIOGAS FACTORY)

A biodigester (or anaerobic digester or sludge digester) is an environmentally-friendly way of treating waste water that fully recycles organic waste. It must be sited in an area where there is enough space, a frequent source of organic matter and a need for the biogas and the digestate. The reactor can be connected directly to toilets and have an additional inlet for kitchen waste or other organic waste. The recovered biogas can be used for cooking or heating purposes. The composted sludge can be used as plant fertilizer.

For islands very popular with tourists, the available sanitary installations should be adapted to the number of visitors and should be properly cleaned and maintained, especially during peak tourist periods.

Controlling pollution from pleasure crafts...

In other respects, **controlling discharges of grey and black waste water²⁶ of pleasure crafts** into the marine environment and pleasure craft cleaning water poses a real challenge for preserving the environmental and sanitary quality of the islands. For instance, the **islands of Port-Cros and Porquerolles** (France) required pleasure crafts anchoring in certain marine areas to comply with clean boats regulations. However, checks by officials in the field were very quickly judged to be impossible. To mitigate this, the national

park of Port-Cros has adopted a recognition tool, the “Bateau Bleu” **label**. In order to obtain this appellation, pleasure boaters must meet 4 criteria: limit health hazards due to black water by using a holding tank or treatment system; avoid fuel losses during refuelling by installing a discharge prevention system; use environmentally-friendly cleaning products; minimize noise and gaseous pollution. In 2018, 20 local boating companies had adopted this approach, which has not (yet) been imposed on individual pleasure boaters. The authorities should support this type of scheme (other quality certificates exist, such as “Port Propre” (clean harbour) or “Pavillon Bleu” (blue flag)) and port **environmental certifications**, so as to expedite their implementation on all the islands and eventually extend them to all pleasure boaters on all coasts, whether or not they are protected.



- ✓ Given the significant constraints of small islands, constructing or rehabilitating their purification infrastructure and sewerage systems (which are often beyond their technical and financial capacities) requires external technical and financial support.
- ✓ Research and development in innovative techniques adapted to the constraints of the islands, enabling water savings and environmentally-friendly treatment of waste water must be supported (water-saving appliances, phyto-purification, biodigesters, etc.) to enable them to be developed by the market.
- ✓ Initiatives in favour of better waste water management by pleasure crafts require the support of the authorities if they are to be rolled out more fully.



²⁶ Grey water = domestic waste water, mildly polluted (for instance, water drained off from a shower or handbasin)/Black water = toilet wastewater, i.e. waste water containing faecal matter and urine among other things.



ISSUE 6

Encouraging new uses of waste water

This statement about the city of the future²⁷ is also valid for the island of the future: *“It would appear that water «sorting» is just as important as waste sorting. Separating water into waste water, clay water and domestic waste water makes more efficient use of nutrients in farming and forestry, but also more efficient use of biogas produced from purified sludge and food waste. Purified waste water is also a significant resource for energy generation in district heating and cooling systems.”*.

Re-using waste water

One future avenue is to set up service-sector waste water treatment systems with a view to guaranteeing its re-use, for farming purposes in particular, but regulations do not always allow this. National legislations are very restrictive, more particularly in sanitary matters, because they apply the precautionary (safety-first) principle. Waste water re-use projects like those of **Sardinia** (see box below) are inconceivable in France at present, given its very stringent regulations.²⁸.

RE-USING WASTE WATER IN SARDINIA

*In Sardinia, spreading waste water after treatment is permitted. Given its considerable moisture deficit, Sardinia (including the **island of Asinara**, involved in the ISOS project) has demonstrated that the re-use of purified waste water (RWW) can help in the quantitative and qualitative protection of water resources. The Region has drawn up a list of priority and strategic RWW installations and has laid down general rules, such as:*

- *Banning new discharges into the sea;*
- *Banning discharges into the soil within a radius of 2 km from the coast;*
- *Re-using water in coastal establishments;*
- *Converting existing discharges into the sea into re-use.*

This experiment has demonstrated several benefits:

- *Natural treatment systems (phyto-purification) through the creation of “constructed wetlands” are particularly suitable for purifying the waste water of small communities with fluctuating populations;*
- *RWW is done near the area where waste is produced, so the distribution systems are less complex and cheaper.*

and has also reached certain limits:

- *RWW does not guarantee self-sufficiency compared with conventional supplies, because the re-used volumes are small and vary according to season;*
- *The complexity and the regulatory requirements are considerable, more particularly with regard to the possible types of re-use (environmental, productive irrigation, ornamental irrigation, civil).*

Source: Workshop Papers, Bonifacio ISOS, 2018

²⁷ Prof. RANHAGEN U., September 2017. Swedish Engineer Academy IVA and KTH «La ville de l'avenir»

²⁸ French order regulating the use of treated waste water for irrigation • <https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000029186641&dateTexte=&categorieLien=id>



RE-USE OF NON-CONVENTIONAL WATER RESOURCES IN THE HYDROUSA PROJECT

The Hydrousa²⁹ European project, which started at the beginning of 2018, consists in setting up 6 innovative pilot facilities based on the nature of water and waste water treatment and management by closing the water cycle and boosting farm and energy production; this is done on 6 sites on 3 Mediterranean islands where water is in short supply (Lesvos, Mykonos and Tinos).

In this context of moisture deficit, the presence of costly solutions (desalination of seawater, water transfer, etc.) and often inefficient sewage disposal and treatment, the Hydrousa solutions seek to address these situations by re-using non-conventional water resources (waste water, rainwater, seawater, humidity in the air) and recovering other resources from treatment processes (energy, nutrient, sea salt) to satisfy needs and create value by minimizing the environmental impact or even by improving the ecosystems (eco-tourism, farming and derived products).

In this respect, a regulatory analysis is also being carried out on a European and national scale (8 European countries), focusing on all the regulatory curbs on the infrastructure they are putting in place: re-use of rainwater and purified water (in particular for farming), the use of compost, etc. These studies are still ongoing and already point up the considerable differences in national regulations in Europe.

Sources: Hydrousa press release, SEMIDE, January 2018 and "Analysis of Policies in EU Context", Hydrousa, 2019



²⁹ Hydrousa is a European project funded by the Horizon 2020 Research and Innovation programme (the project was launched on 1st July 2018 for a period of 54 months with a total budget of 12 million euros)

On the **island of Porquerolles**, the re-use of waste water was introduced over 40 years ago for watering orchards and conservatories. Waste water from wastewater treatment plants flows into a lagoon system (three lagoons in cascade) covering an area of one hectare, and is then filtered by edge-type filters before being drip-distributed. However, the irrigation of other crops (e.g. for market gardening) has not been implemented, in view of very stringent French regulatory requirements in this respect.

There has been a recent development on the subject at European level: on 12 February 2019 the members of the European Parliament adopted a draft regulation aimed at encouraging the use of waste water for irrigating different food-producing or other crops. However, the quality criteria laid down by the EU's Joint Research Centre (JRC) must be met. The Commission is tasked with studying over 5 years the suitability of other uses, but the re-use of waste water can nonetheless be authorized by Member States during this period, in industry, amenities and the environment³⁰.

The low uptake of this practice in France has been deplored by several stakeholders, including local authorities and water operators. "Some of them consider that the distrust of regional health agencies is hindering the development of such projects. Others point up questions that are still unresolved, like the presence of micropollutants"³¹. »

Recovery of sludge from wastewater treatment plants

Recovering sludge for energy purposes (fuel or gas generation) or for farm spreading is possible if the capacity of the soil and the nature of the sludge so permits.

European regulations allow the spreading of sludge produced by wastewater treatment plants or lagooning in conventional farming, but not in organic farming³².



- ✓ Re-use of waste water is a very promising avenue for helping save fresh water on islands, but national and international regulations are still restrictive and need to be adapted. Regulations on these matters vary from one European country to the next, and standardization in this respect would be desirable.
- ✓ Setting up promising water management solutions is hampered by national or European regulatory curbs (as was recently demonstrated in connection with the Hydrousa project). Changes in regulations therefore need to be made, factoring in the specifics of islands at different levels, and convergence of national regulations in Europe, currently widely differing on these matters, should be achieved.

³⁰ S. SENET, 12 February 2019. *Journal of the environment – The European Parliament encourages the re-use of waste water* <http://www.journaldelenvironnement.net/article/le-parlement-europeen-favorise-la-reutilisation-des-eaux-usees>, 96118

³¹ LAPERCHÉ D., 20 March 2019. *Re-use of waste water: towards a development of projects?* Article published on actu-environnement.com

³² https://agriculture.gouv.fr/sites/minagri/files/cgaer_14074_2015_rapport.pdf



**ENERGY
& LIGHT POLLUTION**





Dependence on fossil energy and the continent

Small islands are isolated territories highly exposed to natural hazards and characterized by often poor local energy resources. They are thus more often than not dependent on costly imports of energy from the continent (costs generated by transport for islands that are not connected, or by maintenance of the grid for connected islands). Their problems vary depending on whether or not they are connected. When energy supplies are imported, energy resources are available thanks to an interconnection with the continent close to the island (submarine cables, deliveries by boat). In such cases, islands are totally dependent on the continent. Energy resources are sometimes produced in situ using fossil or renewable energy. Depending on their consumption and production capacities, certain islands favour both supply methods to meet demand (the demand of inhabitants and visitors, economic activities and the transmission system between the island and the continent). For the islands it is a question of achieving a degree of energy self-sufficiency and of reducing their dependence on fossil energy.

Island constraints make the grids particularly sensitive to variations in production and consumption (storage difficulties in particular) and make their management more complicated to permanently balance energy supply and demand. However, the islands have high potential with regard to renewable energies (wind, sun, biomass, etc.).

On this subject too, actions cannot be taken without a legislative framework better suited to the special case of islands. Indeed, as pointed out in a recent Declaration of the Conference of Peripheral Maritime Regions “ (...) because of

the specific characteristics of their infrastructure assets and their real possibilities of accessing the European energy market, islands and outermost regions have to bear additional energy production costs and the costs of redeveloping and restructuring their economic sectors.”³³

The main issues and future prospects

The main identified issues in matters of energy and light pollution on small islands are as follows:

- Reducing energy consumption;
- Controlling energy consumption;
- Encouraging local and low-carbon energy supplies;
- Ensuring energy transition respectful of heritage and biodiversity;
- Mitigating the impacts of artificial lighting on biodiversity.



³³ CPRM, 2019. Final declaration adopted by the CPMR Islands Commission - Corfu, 21 March 2019.

ENERGY CONSUMPTION

The main way that islands can reduce their energy impact is to make energy savings. Reducing consumption does not just make financial savings but more importantly reduces carbon emissions and energy dependence. To that end and given

their specific constraints referred to earlier, the islands must demonstrate particular restraint in their consumption of energy. Priority must be given to **reduction at source of energy consumption** and **energy management**.



ISSUE 1 Reducing energy consumption

Evaluation of energy-hungry sources

Thorough knowledge of sources of energy consumption necessarily involves an **audit of energy and GHG** (greenhouse gases). This more particularly consists in collecting and analysing consumption data and in characterizing the main energy sources. This audit should cover all the island's consumers of energy: the public sector, private-sector companies, residents and transport (road and sea). This work (which for instance was done in 2019 for the **island of Porquerolles** in France) is an essential basis for drawing up an energy map and determining areas for improvement, which ideally should be debated and adopted with the involvement of local stakeholders.

Improving the energy efficiency of existing buildings

Reducing consumption is above all a matter of avoiding unwarranted energy losses due to old and faulty installations ill-suited to the local climate.

The use of air-conditioning, a veritable “energy guzzler”, is an extreme issue, whereas tragically the air-conditioning market is booming. This phenomenon is due to the poor insulation of current buildings, both old and more recent ones,

compounded by the constant search for yet more comfort, and repeated heatwaves.

In the search for energy self-sufficiency, the islands cannot ensure this type of trend. The example of air-conditioning demonstrates the **need to improve energy efficiency in existing buildings** (better insulation of private and public buildings, which also helps make savings in heating) **and to impose strict regulations on future buildings**.

Modernizing public lighting

Significant energy savings can be made by improving public lighting. Several experiments involving the replacement of lighting with low-energy LEDs have proved conclusive (see the examples of the **island of Sainte-Marguerite** in France and the **island of Capraia** in Italy, in the box below). These improvements also help reduce light pollution (as long as the right type of LED is used, see the following chapter on light pollution).



LEDs for public lighting

Island of Capraia (Italy)

Public lighting meeting environmental requirements has been installed with low-energy LED light fittings fitted with a lithium energy storage battery and a solar panel.

Island of Sainte-Marguerite (France)



Plans to replace lighting with LEDs were implemented in 2015 and 2019: Lighting the island's pontoons and roads decorative lighting of Fort Royal. As a result, by the end of 2018 the town had halved Sainte Marguerite's power usage, down from 71,420 W in 2014 to 35,320 W in 2019, making a saving of €8,000.

Source: ISOS technical workshop papers, Capraia, May 2019



The islands must prioritize the reduction of energy consumption, the best way forward for them in this respect (by conducting energy and GHG audits; supporting the improvement of energy efficiency in buildings; renewing public lighting, etc.).



ISSUE 2 Controlling energy consumption

Instilling a sense of responsibility into stakeholders

Campaigns educating residents, tourists and economic agents (maritime transport, retailers, etc.) are essential to winning the support of all the island's users and to achieving good results in terms of responsible and controlled consumption.

A better balance between energy demand and supply

So-called "smart grids" help consumers adjust their consumption according to real-time variations in the price of electricity. For instance, in households and companies using

the EcoGrid³⁴ system on the **island of Bornholm** (Denmark), controllers have been installed to determine which devices should be switched on or off according to the time of day or night, the weather and to monitor changes in market prices. Each user becomes responsible for his or her consumption and can turn peaks in demand to their advantage. In the same spirit, another international research experiment on the **island of Tilos** in Greece³⁵ consists in feeding in renewable energies, storing energy in advanced batteries, smart metering and managing domestic demand. It has installed more than 50 smart meters and panels in the local households. Devices allowing real-time monitoring of power usage and remote

³⁴ <https://www.courrierinternational.com/article/2013/08/29/le-reseau-electrique-le-plus-intelligent-du-monde>

³⁵ <https://www.renewables-networking.eu/documents/GR-Tilos.pdf>

control of certain electricity charges, which enables the application of strategies encouraging people to use less energy during peak hours.

of electric charging stations for pleasure craft in ports should be tested (raising awareness of users, and real savings).

Capping consumption

Energy consumption can also be controlled by imposing a limit. For instance, limiting the use



Better control of energy consumption will involve the implementation of technological innovations (like SmartGrids that better balance demand and supply), regulations (limiting certain uses) and consumer awareness-raising and empowerment measures.

RENEWABLE ENERGIES, LANDSCAPES AND BIODIVERSITY



ISSUE 3

Encouraging local and low-carbon energy supplies

Shared conclusions...

There is now virtually unanimous agreement about the importance of switching from polluting and costly fossil energy to innovative technological solutions using **local and renewable energy resources**, insofar as environmental conditions so permit. Yet this transition is particularly important for the islands, which are generally highly dependent on imported energy. Many non-connected islands are very dependent on domestic oil (fossil energy) for electricity generators. More and more islands are carrying out renewable energy generation projects to reduce their energy dependence on the continent and their environmental impact.

Initiatives for installing renewable energy generation systems come up against several **regulatory limits**, especially in France, where islands are not allowed to generate their energy locally without going through EDF, the public energy distributor (a dispute between the public authorities and EDF is currently being debated in the European Commission). Another example: for the **island of Porquerolles** (France), three different regulations, primarily on the preservation of heritage and landscapes (conservation area) prohibit the installation of solar panels.

Solutions that have proved their worth, and promising avenues to explore ...

The Lerins-Grid project on the **island of Sainte-Marguerite** (France) for instance aims to develop islanding (aka isolated operation), i.e. **an independent power supply** without a connection to the continent. An islanding switch and a battery controlling frequency and voltage have already been installed. Eventually, a shade house with solar panels and fields of solar panels will be installed to complete the energy generation system. The batteries and storage units have been camouflaged so as not to spoil the landscape. This project, labelled Flexgrid and Capenergies since 2017, is a world first and represents high potential for island environments.

With regard to regulatory limits, it appears necessary to adapt **certain regulations** in order to allow islands to make progress in their energy independence.

Technological innovations offer solutions to overcome these difficulties. One example addressing issues 3 (the possibility of bypassing regulations limiting renewable energies) and 4 (better landscaping) is the advent of new solar tiles developed by a small Italian firm³⁶, which reproduce the curves and colour of the traditional clay Roman tile while incorporating photovoltaic solar cells and thus blend perfectly into the landscape.



But in general there is a lack of research and development on such innovations, which should be supported.

Lastly, the CPMR and the Greening the Islands association have recently pleaded in favour of **redirecting European fossil energy credits for islands towards renewable energies**: *“Regarding renewable energy generation, one has to admit that most islands in the EU have achieved far less ambitious objectives than territories of the continent, primarily because of the current regula-*

tory framework on energies, which is obsolete and fails to take innovative environmental solutions into consideration. So we urgently need incentives to generate better renewable energies on the islands [...] by redirecting current subsidies for the energy independence of islands from fossil energies to renewable energies and smart grids.”³⁷

In this respect, it is worth noting that Italy has an *“Economic development decree for energy on small non-interconnected islands”* that directs financing towards energy facilities in these territories. In this respect, the **island of Capraia** (Italy) recently benefited from state subsidies to achieve the targets it set itself, namely 180 solar panels and 250 thermal collector panels. Such a scheme for this type of aid should be adopted in France, and even more generally at European level.



³⁶ Ecosourcesinfo Site June 2017 Invisible solar, a traditional Roman tile with solar power • <https://www.ecosources.info/innovations/443-invisible-solar-une-tuile-canal-traditionnelle-a-energie-solaire>

³⁷ CPRM & Greening the Islands, 18/06/2019, Bruxelles. Towards a structure dialogue for EU Islands.



✓ The islands have high potential in matters of renewable energies (wind and solar in particular), and they must continue implementing renewable energy generation projects enabling them to reduce their energy dependence on the continent. It is important that they include the maintenance/repairs facilities in the installations in order to guarantee the long-term development of these forms of energy.

- ✓ It is necessary to adapt to the particular context of the islands certain regulatory constraints that hampered islands from implementing innovative energy solutions.
- ✓ Research and development in innovative solutions adapted to the context of the islands is insufficient.
- ✓ Financial aids for the development of renewable energies on the islands could be improved (in France by introducing specific aids as Italy does for economic development for energy on small non-interconnected islands, or even by redirecting European credits for the self-sufficiency of islands from fossil energies to renewable energies).



ISSUE 4

Ensuring AN energy transition respectful of heritage and biodiversity

Wind turbines: Particular attention must be paid to birds and bats

Wind turbines can provide a useful supplementary power supply on islands, which are often very windswept. However, they can have negative impacts that must be taken into account, more particularly on avifauna and the landscape.

A study has been carried out by the Sardinia region with the École Polytechnique on the possibility of installing renewable energy generation systems and their impacts on the landscape. The study's main recommendations for islands wishing to install wind turbines are as follows:

- In the design study, take due account of population concentration, cultural heritage and landscaping values;

- Think about site accessibility;
- Adjust the height of the blades according to natural features (mountains, tree, anthropogenic infrastructure);
- Avoid wind turbines casting shadows on buildings;
- Carefully plan the siting of the wind turbines in urban development plans;
- Contain the proliferation of mini-wind turbines for own consumption in urban areas.

In the analysis, special attention should be paid to the risk of birds and bats colliding with the blades, and the measures required to avoid this type of impact on biodiversity.

Solar panels: The landscaping issue

By the same token, when regulations so permit, installing solar panels can contribute to the energy mix and increase local generation of energy on the island. But as for wind turbines, both in urban and in rural areas, installing solar panels also has impacts: they take over farmland, they cause desertification due to reduced airflow, have scorched earth effects, dazzling effects, cumulative effects in built-up areas, etc.

Among the recommendations put forward for this type of development, the following are more particularly cited:

- Due observance of the planimetric model (the ratio of open to occupied space, reference context);

- Due observance of the distances between installations;
- Choosing the best technological characteristics for the panels;
- Limiting reflections by controlling the tilt of the panels.

A solar panels installation study has been carried out for the **island of Asinara** (Italy). A mapping of the island's landscaping and legislative constraints has identified areas where solar panels are prohibited and areas where they can be installed subject to size restrictions.

The study has above all demonstrated that it is still very difficult to develop renewable energy generation installations on small islands while at the same time preserving the landscape and complying with regulations.



The negative effects of renewable energies on the landscape and biodiversity are now well known and must be taken into account by the local authorities before installation commences.





ISSUE 5 Mitigating the impacts of artificial lighting on fauna

Strong impacts

Lighting has strong impacts on the flora and fauna. This is more particularly the case for **sea birds** and **bats**.



Puffins (observed for instance on the islands of **Tavolara and Pianosa** in Italy) feed at sea but nest on land. Their distinctive feature is that they hunt at night and return to their nest in the dark, navigating by the light of the stars and the moon. Artificial light increases the vulnerability of the species (more predation because they are easier to see; deterioration of their habitat that is always illuminated; fledglings that fall, attracted by the light, cannot regain their nest and die of abandon, etc.).

Work done by the University of Naples has shown the consequences of light pollution on bats: firstly, their greater vulnerability as prey, as light pollution makes them easier to see; secondly, famine, as the number of insects in forests decreases (they are attracted by external light) and dehydration, as they are afraid to drink illuminated water; and finally disorientation, due to the fact that artificial light is similar to natural light.

Tried and tested solutions

In order to limit these negative impacts, measures reducing night lighting should be adopted. To that end, there are three possible means of intervention: altering the characteristics of the light pots themselves, rearranging their layout, and modulating the time dimension of the lighting. More specifically, the main measures required consist in:

- Lighting only the necessary areas (preserving dark areas for the animals that use them);
- Reducing the intensity of the lighting (avoiding excessive lighting; monuments such as churches are often over-illuminated);
- Improving the orientation of lights (angling the lighting downwards; avoiding dispersion of light towards the sky and sea);
- Factoring in the composition of the light. Sensitivity to any given wavelength varies according to species. In order to mitigate the impacts on biodiversity, as a basic principle, lamps emitting a narrow spectrum are recommended. This reduces the number of species and biological functions potentially affected.³⁸
- Use LED lamps, but choose LEDs emitting warm white, i.e. having a low colour temperature, to mitigate the adverse effects of blue wavelengths (which attract nocturnal insects and also have a role in deregulating biological clocks);
- Avoid lighting at all times (switch off lights after a given time; use human motion detection technologies to switch lights on, etc.).



³⁸See the table showing the sensitivity of species to different wavelengths: Romain Sordello: How to manage artificial light in ecological continuums? Sciences Eaux & Territoires 2018/ • <https://www.cairn.info/revue-sciences-eaux-et-territoires-2018-1-page-86.htm#>

To facilitate the recognition of light disturbance, guidelines and rules must be included in the islands' planning and management documents

(see an example in **Saint Barthélemy** in France in the box below).



Introduction of a light pollution regulation at Saint Barthélemy (France)

Aims Limit the impact of light pollution on the island's biodiversity

Principles

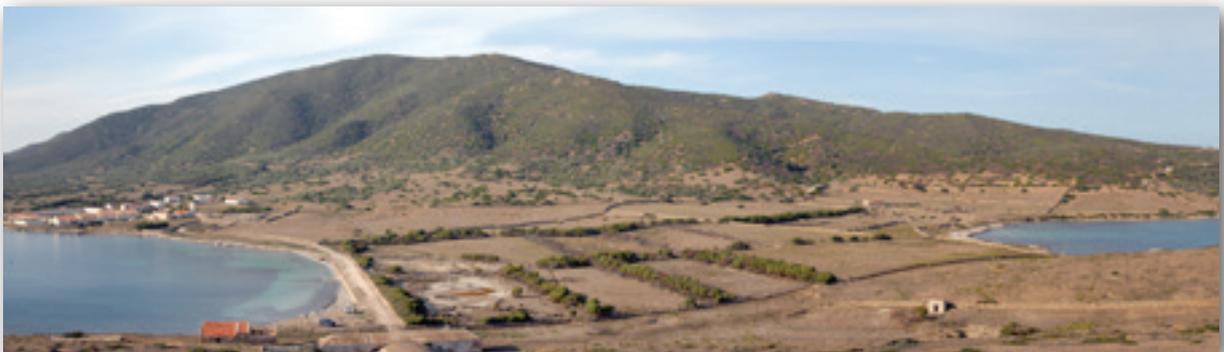
A regulation specific to the island has been introduced, imposing several measures, including:

- Reducing new light sources, in particular near to protected natural areas;
- Improving the orientation of luminous fluxes by angling lighting downwards towards the ground (not upwards towards the sky);
- Devices that channel the beam of light ("full cut-off" lighting);
- Reducing installed luminous intensity;
- Optimizing lighting time with motion sensors or timers;
- Choosing lighting with a yellow-orange visible spectrum: a wavelength between 575 and 700 nanometres;
- Choosing low-pressure sodium lamps, or even amber narrow-spectrum LEDs (not metallic iodide lamps that have a wide emission spectrum, like white LEDs).

Results

This new regulation aims to reduce the impact on bats and migratory birds, both in sharp decline.

Source: ISOS technical workshop papers, Capraia, May 2019



It is worth noting that reducing light pollution has two important additional benefits: it makes **energy savings** (and thus money savings), and it improves **astronomical observation** conditions. Certain islands have introduced public lighting reduction measures precisely for the purpose of

night sky observations. This is the case for instance of the “Starlight Reserve” on the island of **La Palma** in the Canaries (Spain)³⁹, which has led to recognition of site as a location for observing the stars, and a 50% increase in demand relating to astro-tourism.



Mitigating the negative impacts of artificial lighting on biodiversity (birds and bats in particular) presupposes the introduction of a local regulation and the installation of appropriate lighting systems. These measures have the additional advantage of making energy savings and improving astronomical observation conditions.

³⁹<http://www.starsislandlapalma.es/en/the-island/the-sky-starlight-reserve/>



CONCLUSIONS





Thinking and work undertaken in connection with the ISOS project and within SMILO shows that **many** environmental **problems** encountered on the small islands **have the same causes**, in particular:

- The additional costs incurred by the distance between an island and the neighbouring continental coast, which increase in proportion to the distance (transport, cabling, etc.);
- Often limited access to resources, not least to water and energy;
- Restricted land area (penalizing for large installations, storage facilities, etc.);
- The small permanent population has the consequence of creating a low threshold below which it is difficult to implement selective sorting or install drinking water, waste water treatment and power generation facilities at low cost, etc.;
- The large summer population, with greater pressure on resources, the oversizing of facilities and the attendant overexpenditure;
- The fact that certain national or European regulations fail to take due account of the particular context of the islands. In this respect, recent research work shows that current EU policies and legislation⁴⁰ relating to the islands focus on socioeconomic issues but still fail to address environmental aspects.

Other **sources of problems are more specific** to each of the themes, such as:

- The production and consumption of plastic by the islands' populations and visitors;
- The considerable amount of plastic waste not originating from the islands that washes up on their shores;
- The pressing need for new or rehabilitated water purification facilities and distribution systems;

- Variations in power generation and usage that impact on the grids and complicate the matching of supply with demand;
- The increase in faecal waste (incivility, greater difficulties in nature areas not suitable for development, etc.).

The **islands have real advantages**, high potential for renewable energies, and are often pioneers in terms of finding solutions. Many examples of good practices indeed confirm that they are real laboratories for potentially worthwhile innovations for all the territories. **Avenues of innovation** that warrant research and support need to be explored in the capacity of territories to remobilize their knowledge, techniques and traditional processes; innovative approaches to prevention, the economy and restraint; new collective organizational methods; or even new regulatory or financing arrangements for environmental management.

Locally, solutions for the future presuppose a great deal of public awareness and purposeful policies focusing on **the avoidance and reduction of environmental impacts**. Obviously the treatment and compensation of residual impacts are unavoidable, but the greatest room for manoeuvre and pool of resources can be mobilized by resolving problems at their source. So it is a question of working to change consumption patterns, behaviours and amenities, for example by reducing the production of waste, limiting water and energy usage and improving the efficiency of the power distribution grids.

⁴⁰ P. Emmanouilidou, *The island: a new legal object. Towards a specific status for islands in the Mediterranean*, 497 pp, December 2018.





PRIORITY RECOMMENDATIONS



The priority recommendations made at the end of this White Paper are intended for four groups, each one being an essential link in the chain of continual improvement of eco-management that the small islands wish to implement:



Recommendations for the attention of European and national policy makers

1

Adapt and harmonize national and European regulations, without compromising on the health security of island populations, to enable:

- The re-use of green waste for compost and recycled oils in biodiesel;
- The use of rainwater collected from roofs, more particularly in France, on the basis of exemptions granted to certain islands, and re-using treated waste water, in particular for farming purposes, to make savings in fresh water on the islands;
- Implementation of innovative energy solutions, giving islands the possibility of generating their energy locally without having to go through the public distributor, or even easier installation of solar panels.

2

Promoting European or even international regulations specifically addressing the environmental issues of the islands. Along these lines the Mediterranean islands can rely on article 12 of the GIZC Protocol for the Mediterranean as a basis for their adaptations in national strategies and legislations. To that end, and as proposed in recent research work⁴¹, *“legislative modifications should [...] focus on two subjects, firstly to accentuate protection of island ecology, and secondly to address insularity through a constructive prism, like for example the new Croatian legislation for islands”*, which addresses the specifics of measuring the level of development of these territories.

3

With a view to supporting the action of local authorities and territories, *“modify European and national legislation to **create a legislative framework in favour of the implementation of ecological public procurement contracts**, which play a crucial role in steering investments towards the transition to the circular economy”⁴²*, systematize ecological impact assessments in such contracts and capitalize on local services.

4

Encourage **quality certification** schemes dedicated to the improvement of eco-management on the islands, such as the “Bateau bleu”, “Port Propre”, “Pavillon Bleu” labels or port environmental certifications in the pleasure boating sector with the management of grey and black water.

41 P. Emmanouilidou, *The island: a new legal object. Towards a specific status for islands in the Mediterranean*, 497 pp, December 2018.

42 Quotation from the Final Declaration adopted by the CPMR Islands Commission, 21/03/2019, Corfu • <https://cpmr-islands.org/fr/download/final-declaration-adopted-by-the-islands-commission-in-corfu-on-march-2019/?wpdmcl=5098&ind=1554795699054>

5

As plastic waste is a major issue for the islands, “*approve an **international legally binding agreement aimed at eliminating the dumping of plastic in the oceans***”⁴³. This needs waste producers to be clearly identified as the target of this potential agreement, and needs regional and international organizations to be involved in promoting and enforcing such regulations.



6

Encourage the **creation of protected areas on islands** (on land and at sea) and dedicated management structures allocated with human, technical and financial resources.

7

Raise awareness and train administrative decision-makers in charge of protected island sites in other environmental and energy-related issues, and in the state's commitments in this respect, in order to avoid inconsistencies, for instance between national incentives to develop renewable energies and the restrictions imposed by regional and local authorities. Strengthen the link between local administrations that apply national regulations, the local stakeholders and the national policy makers.

8

Facilitate **tax relief and benefits** for environmental donations (as is already the case for man-made heritage).

⁴³ Quotation from “Recommendations for a plastic-free Mediterranean” in the report entitled “Plastic pollution in the Mediterranean - Let's avoid the trap!”, 2018. P. 21 • https://www.wwf.fr/sites/default/files/doc-2018-06/180608_rapport_plastiques_mediterranee.pdf



Recommendations for the attention of financial funders

1

Improve financial aid measures for European islands, with for instance:

- **Perpetuating European credits for the self-sufficiency of islands**, and actually fulfilling the energy transition of these territories;
- Better **mobilization and allocation of liquidity lines for** outermost regions in the European cohesion programmes, towards the eco-management of outermost islands in the EU for the protection of natural environments, energy transition, or even the fight against extreme events⁴⁴;
- **Arrange aids specifically for the islands**, like the current subsidies in Italy, for the economic development of energy on small non-interconnected islands.

2

Provide financial backing for **constructing or rehabilitating the purification infrastructure and sewerage systems of small islands**, which are often beyond their technical and financial capacities.

3

Steer **specific budget lines towards research and development** in innovative technologies for waste treatment and management and water and energy management, geared to the particular problems and contexts of the islands (see next paragraph).



4

Support programmes and projects aimed at **improving the sustainable and inclusive management of the islands** (integrating social, economic and environmental aspects) through strategic planning and involving greater support of local stakeholders through training, technical support or even networking.

5

Facilitate the mobilization of the Green Fund for the Climate for the islands, for better perpetuation of the funds, to move on from a selective project paradigm to a sustainable programme paradigm.

⁴⁴ See the Final Declaration adopted by the CPMR Islands Commission, 21/032019, Corfu (link below)



Recommendations for the attention of researchers, businesses and innovative start-ups

1

Whatever the subjects, technological solutions must **factor in the context and distinctive features of islands**, such as the limited availability of qualified manpower, the lack of available surface areas, or limited energy and water resources.

2

Encourage research and development, more particularly in the development and production of:

- waste recycling and recovery facilities on small islands, and temporary storage systems the size and operating modes of which are adapted to the constraints of these islands. Promote waste reclamation, recycling and re-use as sources of re-usable raw materials on the island;
- innovative and adapted techniques, enabling fresh water savings and environmentally-friendly treatment of waste water;
- renewable energy production and storage facilities and techniques for reducing light pollution that factor in the context of the islands, in particular the sensitivity of natural environments and landscapes;
- Agro-environmental techniques adapted to the context of the islands;
- Knowledge on these territories: include the study of islands in university courses (any type of course: science, geography, land management and planning, agronomics, architecture, etc.) as a subject in its own right, the study of islands or “nissology⁴⁵”, including multi-annual experimentation.

3

Create a dynamic network and gatherings of experts, researchers, businesses and island stakeholders to facilitate exchanges and prioritize research topics focusing on islands, further knowledge of the needs and constraint of the islands and draw up the “terms of reference” of the problems to be resolved.

4

Disseminate the findings of research work on concrete solutions applying to island contexts to the island's users, businesses and start-ups.

5

Launch **innovative island management “competitions”** involving a completed action at stake (grants, trophies).



⁴⁵ Cf. <https://core.ac.uk/display/83126613> et Réseau ISISA : <https://www.isisa.org>



Recommendations for the attention of the islands' local stakeholders

These recommendations are intended for the territory's stakeholders: local decision-makers, representatives of state services, local administrations, civil society and citizens, retailers, representatives of other economic sectors, visitors and users.

Cross-disciplinary recommendations:

1

Introduce local participatory governance for shared management of resources and common property. This approach can lead to the creation of dedicated committees, which favours the mobilization of the territory's stakeholders. Involve national administrations in the initiatives of island territories. Make the local governance into a legal entity so that it can have dealings with financial funders and decision-makers. Consider periodic meetings between the island's stakeholders in co-construction workshops devoted to the emergence of ideas. Use the media to communicate widely, and along these lines encourage coordinated communication on social media with a dedicated portal. Encourage the emergence of multi-island committees (mainly in archipelagos).

2

Work out operational action plans for integrated management of the island environment and island strategies⁴⁶ (set out as theme-based planning documents as presented further on), island development plans and risk management plans that can focus on specific issues: fire, submersion, etc.

3

Prioritize the avoidance and reduction of environmental impacts by putting in place actions on each of the themes aimed at mitigating problems at source:

- **Reducing the production of waste**, more particularly by implementing the “4 Rs of plastic: reduce; re-use; recycle; recover”. This requires concrete measures such as the elimination of single-use plastic or the introduction of composting, but also indirectly by encouraging changes in consumption patterns and the behaviour of the populations;
- **Reducing fresh water usage**. This change could involve the mobilization of old techniques, the adoption of new technologies, raising awareness of the population about the right gestures, or even introducing financial incentives and regulatory obligations;
- **Reducing water pollution at source**, in particular by encouraging the adoption of environmentally-friendly farming practices (organic farming for instance) and the use of environmentally responsible crop protection products by inhabitants and visitors;
- **Reducing energy consumption** by carrying out diagnoses, supporting the improvement of the energy efficiency of buildings, initiatives such as renewing public lighting and raising awareness with a view to modifying habits.

⁴⁶ P. Emmanouilidou, *The island: a new legal object. Towards a specific status for islands in the Mediterranean*, 497 pp, December 2018.

- 4 Implement **educational programmes** with schools on the islands and in neighbouring coastal territories on the issues of protecting resources, sustainable development, and awareness programmes and information for visitors.
- 5 **Encourage inhabitants to future “ambassadors”** or spokespersons in favour of protection of their island.
- 6 **Provide the human, technical and financial resources needed for control and for enforcing regulations.**
- 7 **Put in place financial mechanisms** incentivizing people to make consumption savings and enabling the funding of environmental plans or projects: collection of a tourist environmental levy on maritime crossings, reverse invoicing/pricing incentives (diminishing cost according to water savings or waste production), etc.
- 8 **Diversify sources of funding** for environmental projects on the islands by integrating opportunities for cooperative projects, private foundations, business sponsorship.

Recommendations on the theme of waste:

- 9 Adopt **ambitious waste reduction, collection and recycling/recovery plans**, with a long-term public action and investment strategy and a follow-up system, in order to *“achieve 100% of waste collected thanks to effective waste recycling and integrated management plans [and] increase the amount of recycled and re-usable plastic waste from 30% to 100% by 2030”*⁴⁷, including better education of inhabitants and visitors. Plan concerted management between the island and the continent and pay special attention to the improvement and standardization of sorting methods and instructions, systematizing sorting for inhabitants, encouraging visitors to take their waste back with them to the continent and installing containers on the continent at shuttle departure/arrival points. Pay special attention to the major issue of plastic waste and to the management of bulky waste, difficult to deal with on islands.
- 10 On the particular problem of the increase in **faecal waste** for islands confronted with it, resolve the inconsistency often seen between the ban on pollution and the absence of dedicated solutions and infrastructure. To that end, put in place:
 - Appropriate **public facilities** when regulations so permit (composting toilets for instance), provided their maintenance is feasible;
 - **Stringent regulations**, with clear bans and fines for offenders, to link to the question of waste dumping;
 - **Awareness, education and information access campaigns** (from the continent and on the island) aimed at tourists and the inhabitants of the islands.

Finally, not opening up new natural areas to visitors without first having put in place a solution adapted to attendance.

⁴⁷ Quotation from “Recommendations for a plastic-free Mediterranean” in the report entitled “Plastic pollution in the Mediterranean - Let's avoid the trap!”, 2018. P. 21 • https://www.wwf.fr/sites/default/files/doc-2018-06/180608_rapport_plastiques_mediterranee.pdf

Recommendations for water management

- 11 Formulate and implement a **long-term water management and wastewater treatment policy**. *“Training, engineering and pricing incentives must be balanced in a complex set of actions. A long-term outlook on water, sound actions, sustainable water savings and funding for them should be included in all local and regional plans⁴⁸”*. One major challenge is the management of distribution systems, in which large quantities of water are lost.
- 12 Support the implementation of **rainwater collection and storage processes** (traditional ones in particular).



Recommendations for the energy sector and light pollution

- 13 Introduce an **energy consumption control policy** involving the adoption of technologies such as SmartGrids that better balance supply and demand, regulations limiting certain uses, or even consumer awareness-raising and empowerment initiatives.
- 14 Take **measures to mitigate the negative impacts of artificial lighting** on biodiversity by adopting a local regulation and installing a suitable lighting system. These efforts also contribute to energy savings and to the improvement of astronomical observation conditions.

⁴⁸ The state of fresh water on the small islands of Europe. Christian Pleijel – KTH, 01.10.2017.





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BIBLIOGRAPHICAL RESOURCES**

Iconographical resources

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Ile de Tavolara, Sardaigne ©Travel Wild - iStock

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nell'isola dell'Asinara.

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La torre-faro è alta circa 35 metri, presidiata
da farista sino al 1977 poi automatizzata.

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Plan de balisage

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Promenade sur l'île Sainte Marguerite, forêt
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Faro di punta Scorno
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Situato a nord ovest del golfo dell'Asinara,
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Cala d'Oliva
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Cala vicina al centro abitato e alla colonia
omonima penale.

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Patella ferruginea

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Arrachage des griffes de sorcière sur l'îlot
de la Gabinière
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Cala Murichessa
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Cala situata nel comparto nord dell'isola e
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Trabuccato
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Lembo di terra proteso verso il mare nella
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Cala frastagliata da formazioni granitiche
situata a nord est dell'isola dell'Asinara.

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