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Operation ERGOS, a Pilot Project to fight against marine oil pollution

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ABSTRACT

More than a third of oil pollution in marine waters comes from the transportation of crude oil, due either to accidental or to deliberate spills caused by the illegal cleaning of oil tanks at sea. This type of pollution has a very high impact on the marine and coastal environments, with significant implications for different productive sectors closely linked to the sea, such as fishing and tourism, which are vital to maintain the economy of the Canary Islands. Being aware of this problem, in February 2000, WWF Spain designed and put into practice Operation ERGOS: a complete and innovative pilot program for the prevention, conservation, awareness raising and monitoring of marine oil pollution. This program incorporates preventive actions and direct intervention against deliberate and accidental spills. Since its implementation in the Canary Islands, ERGOS has undertaken an intense effort to enhance the quality of the waters and the environment of the Canary Islands, with significant technical and social achievements in the fields of research, awareness raising and intervention regarding oil spills into the sea.

1. Introduction

Over the past century, marine ecosystems have suffered rapid degradation resulting from the intensification and mismanagement of human activities such as over-fishing, excessive urban growth and pollution.

Today, many oil tankers sail in compliance with the regulations on safety and pollution established by the International Maritime Organization; however, unfortunately, many others, outdated and in terrible navigational status, continue to sail the seas of the planet in systematic violation of the regulations, carrying out illegal dumping of ballast water and other effluents that contaminate the marine environment.

The extraordinary ecological value treasured by the coasts and sea of the Canary Islands and the great dependence of the coastal area with economic sectors that are strongly rooted in and highly important for the Islands, such as fishing and tourism, justifies the need to develop and implement effective mechanisms aimed at protecting the coastal and marine environments from oil pollution. For this reason, in February 2000, WWF Spain decided to activate Operation ERGOS: a comprehensive and innovative program to fight against accidental or deliberate marine oil pollution, which covers preventive actions and direct intervention.

ERGOS is the result of WWF's experience in major environmental disasters caused by oil slicks, such as the ones that occurred in Saudi Arabia during the Gulf war (1992), in Patagonia (Argentina, 1991) or after the accident in the *Aegean Sea* (Spain, 1992) among others. Its overall objective is to preserve the quality and health of marine and coastal life by establishing the necessary measures to eradicate the deliberate dumping of crude oil into marine waters and to minimize the probability of future accidents in an effective and regulated way. (Alonso et al., 2002; Bartolomé, 2003)

2. The Working Dynamics of Operation ERGOS

In its field of activity and working dynamics, ERGOS constituted the most advanced procedure to fight against this type of pollution, and was unprecedented in the international context.

Altogether, the operation brought together a whole series of actions and innovative approaches, both in their technical approach, and their social and international projection.

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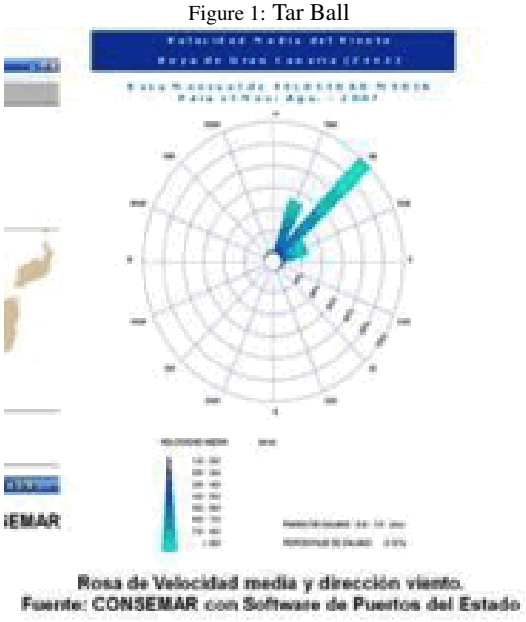
2.1. ERGOS Actions Against Deliberate Spills

Tanker accidents are not the only cause, or even the main one for the oil pollution affecting our seas and oceans; in fact, only 10% of it can be attributed to this type of casualty.

Small and frequent spills of oil-contaminated water, produced by ships in transit that wash out their tanks at sea, are quantitatively much more important. It is little wonder that these ongoing illegal practices are the main causes of the chronic pollution affecting our beaches and coasts with oil-based waste. (See Figure 1)

Figure 1: Tar Ball



Source: WWF

ERGOS was specifically designed to identify and intervene on those vessels that deliberately pollute the marine environment with oil-contaminated ballast water resulting from the cleaning of tanks at sea.

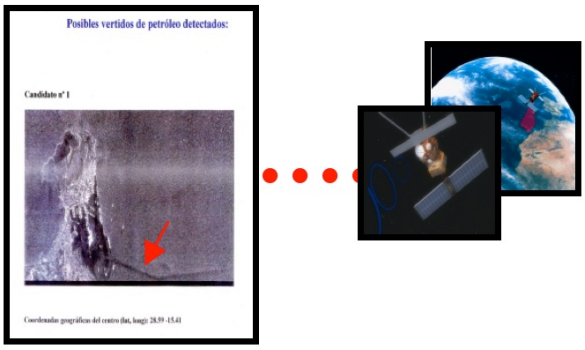
2.1.1. Prevention and Detection

To prevent and detect a deliberate spill, the following measures were established:

ERS II satellite. Under two separate agreements established between the European Space Agency, the National Institute of Aerospace Technology and WWF Spain, in mid-2000, the ERS II radar satellite was activated to detect deliberate spills, day or night, in a marine area of about 300,000 km^2 around the Canary Islands, increasing the coverage to the north of the Islands to increase the observation of the Gulf stream coming from the North of Europe. Images taken by the ERS II were received at the Maspalomas Space Tracking Station on Gran Canaria, where they were processed by operators of the company under the Ministry of Defense, Engineering and Aerospace Services, S.A., specialized in the detection of oil spills in marine environments.

In the event that a spill was detected, results were immediately sent to the regional office of WWF Spain in the Canary Islands, who in turn communicated these facts to the Maritime Safety and Rescue Agency of the Government of the Canary Islands and the Directorate General of the Merchant Marine, to apply the corresponding inspections and sanctions. (See Figure 2)

Figure 2: Recreation of oil spill detection by satellite imagery



Source: WWF

Other control mechanisms. The vessel detection system was extended by WWF Spain through the presentation of specific cooperation proposals for the detection of deliberate oil spills to the different airline companies flying over the Islands, the shipping companies operating in the waters of the Canary Islands and fishermen's associations on the islands. Likewise, WWF Spain contacted the Spanish Navy in the Canary Islands and other agencies to establish cooperation frameworks aimed at complementing the preventive and detection aspects of Operation ERGOS.

Political pressure. Gaps in legislation in EU Member States to implement an effective system of inspection and control allow, among other things, for the operation of substandard vessels.

Tankers, like any other vessel transporting highly toxic products, should implement very rigorous security and safety measures, and this must be verified without exception by the competent authority. In this regard, WWF Spain drew up a series of proposals that the EU will update and that will amend Community legislation on the handling and transport of crude oil, and will tighten up sanctions against companies responsible for deliberate oil spills.

2.1.2. Direct Intervention

The Protocol of direct intervention in the case of deliberate oil spills consisted of the following steps:

Verification and position. Once a spill was detected, the National Institute for Aerospace Technology (Instituto Nacional de Técnica Aeroespacial) would inform the regional office of WWF Spain in the Canary Islands about the exact position of the leak, the dimensions of said leak and the moment in which the image was taken. WWF Spain would immediately alert the Maritime Safety and Rescue Agency of the Government of the Canary Islands so that a helicopter or ship could be sent to the area, to take the necessary samples and, where appropriate, identify the vessel responsible.

Oil spill tracking. After receiving the position of the spill, the Physics Department at the University of Las Palmas de Gran

Canaria would analyze the weather conditions of the affected marine area and estimate the possible evolution of the route of spilled oil and the most likely point at which the oil spill occurred, keeping the spill from reaching the coast.

Companies involved. By means of the Control Records of Marine Traffic in Tarifa and Finisterre, the General Directorate of the Merchant Marine would provide lists of the vessels that had crossed the investigated area during the interval in which the spill occurred.

Comparison of samples. Thanks to the Control Records of Marine Traffic and once the number of ships has been narrowed down to only a few, it was possible to establish the type of load and the refinery where it unloaded the crude oil. WWF Spain would then proceed to collect crude oil samples from those refineries at which suspicious vessels had been unloading. Each type of oil varies in composition based on its origin, so comparing samples from the sea with the various refineries could serve to identify the vessel responsible for the oil spill in a percentage close to 95%.

Evaluation of potential cleaning. In the event that the oil slick may potentially reach the coast, WWF Spain, in coordination with the competent authorities, would activate a special mechanism for the cleaning and assessment of the coastal area.

Report. Once the identity of the vessel was verified, the incident would be communicated to all the authorities of the Canary Islands, and state and community authorities with competence in marine pollution, as well as the bodies involved. At the same time, WWF Spain would take advantage of its global network to inform international public opinion about the alleged acts of the company of the vessel involved in the spill, and to establish appropriate pressure measures.

2.2. ERGOS Actions against Accidental Oil Spills

Major accidental oil spills from tankers have a strong impact on public opinion, and even though quantitatively they are more important than deliberate oil spills, large slicks produced in these accidents cause real disasters that affect both the marine and coastal environments, and local economies.

Given the high density of sea traffic in the Canary Islands, cases such as the sinking of the *Erika* (1999) and *Prestige* (2002) oil tankers could occur in the Archipelago, resulting in ecological, social and economic damages of incalculable consequences for these islands. In view of such a risk, the most suitable formula to intervene effectively is undoubtedly to ensure good coordination between the different administrations and between the latter and organized groups, as well as rapid action with appropriate equipment.

ERGOS foresaw a network of collaborators -volunteer citizens and other entities- that would coordinate with the different competent authorities in the field, capable of responding quickly and effectively to any accidental oil spill affecting the Canary Islands.

2.2.1. Prevention

To prevent accidental oil spills, the following measures were established:

Maritime traffic:

Databases on records, vessels, companies, location of refineries and oil market analysis. A collection of information about vessels and companies transporting crude oil, accidents (causes, effects, prevention, etc.), maps of the location of refineries in Europe, the study of the market of crude oil and derived products, etc.

Tracking of vessels. Close monitoring of vessels which, due to their obvious substandard conditions or records, could cause a possible accident.

Specialized laboratories. Collaboration to make quick comparative analyses of oil samples.

Political pressure. Draft proposals so that the European Union updates and improves the regulations on the handling and transport of crude oil.

Biodiversity:

Maps of risk areas and areas of high ecological and social value. Identification of the Canary Islands maritime corridors subject to higher tanker traffic and, hence, greater risk. They would be analyzed together with maps of the coastal areas with the highest value whether this be ecological, fishing, touristic or another kind.

Ocean and climate studies. Studies of the waves, tides and currents among others, to understand the possible evolution of the route of spilled oil in the waters of the Canary Islands.

Rescue Centers. Immediate fitting out of assistance and recovery centers for the affected wildlife (birds, marine turtles, cetaceans, etc.).

Training for volunteer groups. Training and instruction of volunteers and specialists in all the islands to create a well-organized and effective system of collaboration, coordinated with the competent authorities, when facing an oil slick. (See Figure 3)

Figure 3: Training handbook for veterinary volunteers and brochure for volunteer citizens.

Source: WWF

Intervention materials. Resources needed to face an oil slick: the materials for the collection and care of fauna, the creation of retaining barriers, etc.

2.2.2. Direct Intervention

The Protocol of direct intervention in the case of an accidental oil spill consisted of the following steps:

Tracking the evolution of the accident. WWF Spain would integrate the crisis committee created in view of a possible oil accident, to help as much as possible and follow the disaster closely.

Activation of volunteer rescue and cleaning patrols. Volunteers trained by WWF Spain would be convened and instructed to rescue the affected wildlife and start with the cleaning activities.

Implementing rescue centers. Implementation of wildlife rescue centers to treat affected animals.

Environmental impact studies. Ecological, economic and social studies allowing the assessment of the real extent of the disaster in the short, medium and long term. For example: collecting samples in different areas of the coast affected every two days and for at least three months after the accident (in each case, the duration of the study would depend on different variables: the quantity and type of crude oil, the type of ecosystem and its use by the population, etc.).

Press strategy. Through its international network, WWF Spain would provide media around the world with clear and accurate information about the potential impacts on the affected marine ecosystems, the characteristics of the oil spill, appropriate recommendations for the communities affected and on the responsibility of the oil spill.

Cleaning the oil spill. Volunteers trained by WWF Spain, in coordination with all the mobilized groups, would carry out the cleaning of the coastal area in the shortest time possible.

3. Conclusions

Since its operation in the Canary Islands began, ERGOS has undertaken an intense effort to avoid the problem of marine oil pollution, contributing to the detection of substandard vessels, quantifying the effect on the marine environment of the Canary Islands, promoting significant changes in local regulations and creating prevention systems to react accordingly in the event of a possible oil slick on the Islands.

To achieve this, several agreements were reached with regional and State authorities, scientific (universities) and technical institutions (the European Space Agency and the National Institute for Aerospace Technology), as well as diverse private organizations.

The results obtained were important: in particular, the promotion and attainment of great technical and social achievements from areas of research, awareness-raising and direct intervention to oil spills at sea.

From the activation of the European Space Agency *ERS II* radar satellite in June 2000 until October 2002, WWF Spain, through Operation ERGOS, tracked oil spills across an area of almost 300,000 km^2 around the Canary Islands, providing information that had until then been non-existent in this region, and that is of vital importance to assess the environmental situation of the Islands regarding oil pollution.

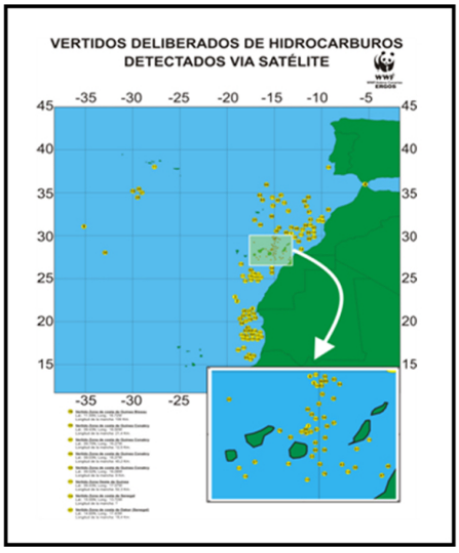
The information obtained was crucial for the development of the pre-trial phase of ERGOS, since it made it possible to identify the areas most affected by these oil spills, as well as the regularity with which they were produced. All this allowed these facts to be reported to the Canary Islands and the State authorities with competence in the matter, contributing to boost the development of specific proposals to improve the existing mechanisms of control and performance, as well as to supplement deficiencies and adapt the resources of the Canary Islands necessary to meet effectively hypothetical pollution situations.

The recorded data showed that deliberate oil spills, although they had decreased slightly since the operation was activated, continued to occur at an alarming rate, demonstrating the impunity with which many oil tankers washed out their tanks at sea. (See Figure 4)

The frequency and volume of spills showed the lack of effective means and mechanisms of inspection and control.

According to the data provided by the *ERS II* satellite, the volume of oil slicks detected in the maritime region of the Canary Islands is a source of concern since it represents 51.70% of the total number of spills reported. Another area that is particularly affected is the coastal region of Africa, standing in the second position with 36.73% of the total. Other areas, such as the coasts of Portugal with 10.20%, and other regions of Spain with 1.36%, are far behind.

Figure 4: Map of deliberate oil spills detected by satellite by Operation ERGOS



Source: WWF

The great difference of percentages is due, in part, to the high traffic of tankers in the waters surrounding the Canary Islands. Many of these vessels navigate in compliance with the regulations of the International Maritime Organization; however, as evidenced, many others repeatedly violate the regulations on the discharge of ballast water as well as other polluting effluents in port facilities suitable for their reception and treatment, and they take advantage of the route from the refineries to the extraction areas to carry out these illegal acts in order to save time and an amount of money that is insignificant when

compared to the damage done to the marine and coastal environment, their resources and health. Not to mention the underlying risk of accidents involving these vessels, which are outdated and in substandard conditions, and continue to navigate the waters of the planet transporting highly toxic substances.

Sometimes, these oil slicks reach the coasts, destroying anything in their path, covering animals, sea beds and coastal areas with tar waste. All this has an enormous impact not only on marine life, but also on the local communities of the affected areas.

For the Canary Islands, this problem is particularly troubling, both due to the frequency of its occurrence and because both tourism -the main economic engine of the Islands- and fishing, depend directly on the quality of their natural resources, waters and coast.

Another important aspect to be considered in the analysis is the possibility that the actual volume of oil spills occurring in the area under study exceeds by far those detected by the satellite. This is because the passes of the *ERS II* on the area covered by ERGOS were not daily, but occurred with a regularity of approximately every 15 days, sometimes by land, and sometimes by sea.

In this way, it can be inferred that the data obtained represent only a fraction of what might be happening. However, the data provided were very significant in terms of meeting the goals of the Operation, emphasizing the systematic practice of this type of highly polluting spills in waters surrounding the Canary Islands, and the usefulness of new technologies for the conservation of the marine environment.

The information collected revealed that the discharges of crude oil into the sea, sometimes with quite considerable volumes, occurred intensely in the Canary Islands, revealing the necessity of adopting urgent measures. To this end, the Spanish Government, through the Ministry of Public Works, decided on the adoption of surveillance systems similar to ERGOS, by recruiting satellites that covered the waters of Spanish sovereignty with higher daily tanker traffic.

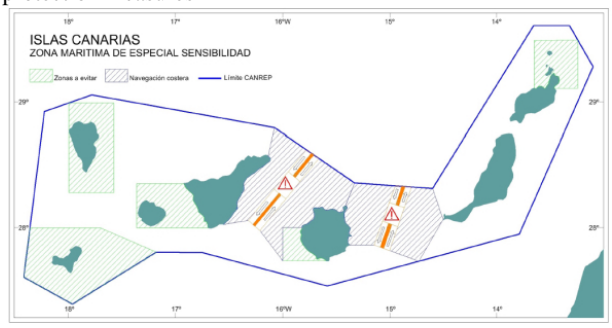
Currently, the European program CleanSeaNet is active. It was activated in 2007 by the European Maritime Safety Agency for the monitoring of oil spills in Community waters. This system has satellites that enable the capture of images of oil spills in real time and can alert Member States over a period no longer than 30 minutes following the capture of the satellite imagery.

Among the main achievements of Operation ERGOS, it is important to highlight the declaration of the Canary Islands as a Particularly Sensitive Sea Area (PSSA), a legal form granted by the International Maritime Organization to very few places on the planet, and that implies that additional measures of special protection are established in order to preserve its ecosystems and biodiversity, in view of their importance for ecological, socio-economic or scientifically recognized reasons, and because their environment may be damaged as a result of maritime activities.

The initial proposal, prepared by WWF Spain in collaboration with the University of Las Palmas de Gran Canaria, was referred to the autonomous Government for review in January 2001. It was in turn sent to the Directorate General of the Merchant Marine of the Spanish Ministry of Public Works, a body that has actively cooperated with ERGOS since its creation.

Finally, after raising the official proposal to the International Maritime Organization, in May 2006 the Canary Islands were designated a Particularly Sensitive Sea Area with three associated protective measures: a required notification of the entry and exit from the Particularly Sensitive Sea Area for vessels transporting dangerous goods; the establishment of two recommended transit corridors for vessels; and the designation of five areas to be avoided by international navigation. (See Figure 5).

Figure 5: The Particularly Sensitive Sea Area of the Canary Islands and its protection measures



Source: Ministry of Public Works

In addition, ERGOS has also worked on the preparation of proposals for the European Union to:

- Review and update Community regulation on the transport and handling of crude oil.
- Tighten up sanctions against companies involved in deliberate oil spills into the sea.
- Remove the navigation license from masters of vessels responsible for these illegal spills.
- Apply trade sanctions to companies involved in proven and verified deliberate oil spills.
- Promote the increase in the number of inspections of tankers in Community ports: all tankers must be inspected at a Community port after transporting oil for long distances. If they cannot confirm the previous cleaning of tanks in facilities approved by the MARPOL 73/78 Convention, these vessels should be held.
- Forbid the movement of single-hull tankers in Community waters.
- Demand compliance with European regulations by all vessels operating in Community waters and ports, regardless of their nationality.
- Promote the creation of a register of oil tankers that meet the regulations, limiting to these the possibility of operating in our waters and ports.

It is also important to mention the progress made in the social domain, having worked with more than 200 volunteers to create teams that are ready to intervene in the presence of future oil slicks in the Canary Islands.

In this regard, it is important to point out the participation of WWF Spain in the cleaning of coasts and the rescue of wildlife affected by the accident of the *Prestige* oil tanker (La Coruña, 2002), making the resources and experience of Operation ERGOS fully accessible to the Xunta de Galicia.

4. Acknowledgements

Operation ERGOS would not have been possible without the logistical support received from organizations such as the National Institute for Aerospace Technology or the European Space Agency, whose contribution in software and satellite imagery was made free of charge for more than two years.

Furthermore, WWF Spain would like to thank the following for their collaboration during the term of Operation ERGOS in the Canary Islands: the Maritime Safety and Rescue Agency, the Directorate General of the Merchant Marine of the Ministry of Public Works, the Ministry of Defense, the Directorate General of Coasts, the University of Las Palmas de Gran Canaria and the Department of Land Planning and Environment of the Canary Islands.

Finally, WWF Spain would like to express its gratitude for the support received from all those who participated in the volunteer training workshops organized by WWF Spain during the project, and to all the organizations that cooperated without ulterior motive.

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