INTERNALATIONAL JOURNAL OF ISLAND AFFAIRS

December 1996

ISSN 1021 - 0814

Year 5 No. 1
## Contents

**Editorial**

Pier Giovanni d'Ayala  

**Islanders at Work**

**News from and about Islands**

**First European Conference on Island Sustainable Development:**

Minorca Conference, April 1997  

P. G. d'AYALA  

**Environmental Profile of the Small Italian Islands**

O. Rossi, M. Vezzosi, G. Zurlini and A. d'AYALA

**Dossier: Waste Management in Small Islands**

**Sustainable Development and Waste Management in Small Island States**

Naresh Singh  

**Utilization of Used Tyres in Civil Engineering:**

The Pneusol-Tyresoil-Nguyen-Thanh-Long  

**Bornholm: Green Island in the Baltic Sea**

Jannik Stenberg  

**Glass Recycling in Remote Areas:**

The Shetland Islands Experience  

Mary Lisk

**Culture and Traditional Knowledge**

**Recycling Art: The Unsuspected Beauty of the Object...**

P. G. d'AYALA (2 PAGES)  

**Lithica**

Xec Florit Nin and Alfred Hutchinson  

**Insula’s Page**

UNESCO and MAB Page  

**Book Reviews**

**Letters to the Editor**

Announcements  

**Join and Support INSULA**

Application for Membership

---

More details and contact addresses inside (pages 4 to 7)
Editorial

This journal, dear readers, has since its inception, in early 1992, addressed several issues considered as priorities from the islanders point of view. One of these is sustainable tourism, which was dealt with at the World Conference held in Lanzarote, Canary Islands, in April 1995. The conference offered a multifaceted view of tourism - which has now become a "leading industry" in the world. Tourism certainly is the industry, but it has its pitfalls, notably the waste it generates - a major problem in many small islands.

Waste is the theme on which we focus in the "Dossier" of this issue. Human beings generate various kinds of waste, seemingly without value, representing what we do not want to keep. When the recipient of waste is a small island, the problem takes on a priority dimension, due principally to space constraints.

This problem - often hidden behind the bushes or the trees in small islands - requires careful study for the mitigation of its undesirable effects. In this issue of the journal, solutions to the problem are proposed and a number of technological innovations are discussed. Well conceived and cost-effective measures, including the organization of collection services and re-use and re-cycling of waste are also considered.

Another issue which we consider of great importance for islanders is information technology. This tool is permitting islanders to get in touch with the rest of the world and to participate in the global information revolution, with all the benefits that this carries with it.

INSULA already plays an important role in this regard through the multinational Tele-Insula project. This project is supported by the European Commission, and aims to link islands to one another through the wave of telematics.

Conference on Sustainable Island Development

Very soon, INSULA will be organising the "1st European Conference on Sustainable Island Development". The conference, which will be held in Minorca in April 1997, aims, amongst other things, to create a concrete framework for inter-island cooperation, a must in a swiftly changing world.

Several themes will be debated at Minorca including:

- technological progress for islands, in its several aspects, such as information technology, renewable energies, transportation, etc.;
- the cultural heritage of islands;
- islands, conflicts and international politics;
- natural and man-made disasters, prevention, mitigation and relief.

More information about this conference is carried in the "News on and about Islands" section.

As stated in previous editorials, one important goal of INSULA is to encourage and support initiatives which improve the welfare of the islanders, and the promotion of sustainable development is considered as a major objective in this regard. It is for this reason that we consider the Minorca conference - which specifically focuses on the sustainable development of islands - as a very important event.
First European Conference on Sustainable Island Development

In July, 1996, INSULA – the International Scientific Council for Island Development – and the Conseil Insular de Menorca (Menorca Island Council) signed a Protocol of cooperation, at UNESCO’s headquarters in Paris (see picture). This was the first step towards holding the First European Conference on Sustainable Island Development.

The conference is supported by UNESCO, the Spanish Ministry of Environment, the Balearic Islands government, and relies on the active participation of the European Community institutions, together with the relevant UN Organizations.

The recommendations and ideas stemming from the global UN Conference on sustainable development of small developing island States (Barbados 1994) have inspired the present European initiative to be considered as an effective contribution to the V Community Program of Policy and Action “Towards Sustainability”.

Insular societies and European Island communities are bound to face the new challenges for their development, brought forward by a swiftly changing world, characterized by globalisation and strong competition.

To improve the management of all their resources, and to act from the specific viewpoint of islandness, becomes the primary issue at stake.

Strengths and limitations must be better understood and appreciated together with the opportunities offered by scientific and technological advance. The search for shared and mutually supportive solutions is, no doubt, the way to secure a safe road towards sustainability, where economic development, social and cultural progress, together with environmental protection, are recognized as inter-dependent factors.

Islanders of Europe will meet in Menorca to try and forge agreements and give form to initiatives that will lead to effective inter-island cooperation, aimed at fostering sustainable development. This is a project that, in Europe, affects more than 500 inhabited islands. The island of Menorca is the ideal setting for this gathering of different European island cultures. As a Biosphere Reserve, it is a prime example of conservation and development and therefore, the ideal venue for a European island forum.

Voices from non-European islands are welcome to attend the debate.

Conference Objectives

The Minorca conference has the following objectives:

- Establishing among European islands a cooperation framework based on the objectives set forth in the “Minorca Commitments”.
- Promoting the work and achievements of European organizations.
- Proposing joint pilot projects and specific undertakings in favour of island sustainable development.

Themes

The conference will focus on the following themes:

- Instruments and Tools for Sustainable Development
- Island Societies and Technological Progress
- Increasing the value of Cultural Heritage

Instruments and Tools

Islandness is in itself a value, a comparative advantage to be duly taken into account in island development strategies.

As such, in designing paths for sustainable development, ways must be sought to foster innovation diversification and the identification of new products and markets, as a basic condition to insure the competitiveness of island enterprises.

Competitiveness can be strengthened by developing inter-islands organization systems achieving significant scale-economies, especially for transport, tourism and financial services.

The quality of traditional products can be enhanced, and become the object of appropriate marketing strategies.

An efficient sustainable use of natural land and sea resources should also be considered as a pillar for future-oriented island economies.

In light of this, integrated planning and the introduction at all levels of the appropriate legal and financial incentives should be promoted enabling an optimal consensus among all island actors.

Within this framework the role to be played by the European Union is vital in supporting cooperation endeavours. A special reference should be given to the needs and realities of islands, many of them representing European peripheries, being nonetheless, vital European partners.

Technological Progress

There are two main strategies for dealing with the inherent difficulties that islands have in generating technology.

Technological development must be adapted to the reality of each island, setting up the necessary filters for the transfer of technology from the mainland. Islands should also increase specific cooperation in this field that will lead to specific technological systems based on their own resources. As coastal ecosystems are fragile, there is a need for ecologically sound technologies, conceived as “process and product technologies”, whose impacts can be absorbed. It is a question of developing complete systems; including technical studies, goods, services and capital, and organization and management procedures; rather than individual technologies.

Technology in the fields of energy and renewable resources and environmental investment and transport are especially inter-island transport - is constantly advancing and the future is bright. But, islands must define their own options, adapted to their own particular environmental and territorial needs and avoiding the disastrous consequences involved in imposing inappropriate models.

Technological progress in fields such as telecommunications and teleomatic applications means that prospects are good for all sectors (public, private and all activities) of island economies.

The future also holds hope in fields such as farming and fishing, water resource and waste management, all of which have an important bearing on quality of life on islands.

Cultural Heritage

The wealth and diversity of the cultural heritage of islands is a microcosm that must be suitably protected and appraised. Island landscapes have been sculpted by the efforts of islanders, over the centuries, leaving numerous remains in archaeological sites and on the landscapes of the successive civilizations that have inhabited the islands.

Historic sites, traditional architecture and local customs are the tangible and intangible heritage of the cultural past and present identity of island cultures. This heritage should be the cornerstone of “soft tourism” strategies and should be considered as a basic asset in the development of the islands.
First European Conference on Sustainable Island Development

THE MINORCA COMMITMENTS
Preliminary Draft

1. We recognize the significance of socio-economic development and human well-being for the people of our islands and shall give to these goals the highest priority from now onto the twenty first century.
2. We acknowledge that our societies are compelled to respond more effectively to the challenges presented by a fast changing world and to the material and spiritual needs of individuals, their families and the communities in which they live throughout our various countries and regions.
3. We are deeply convinced that economic development, social and cultural progress and environmental protection are interdependent and mutually reinforcing components of sustainable development and social justice.
4. We acknowledge that people are at the centre of our concern for sustainable development and that they are entitled to a healthy and productive life in harmony with their traditions, identities and with their environment.
5. We are convinced that as peripheral and isolated entities, sustainable progress will perhaps remain for long out of reach of our efforts and that only by joining hands and working together exchanging our experiences and hopes, we shall overcome the obstacles which still condition our islands present.
6. We gather here in Minorca with full awareness of the difficult tasks that lie ahead but with the full conviction that through our common will and determination, major progress for our islands can and will be achieved.
7. We commit ourselves to the above considerations and to engage actions for enhancing an equitable sustainable development and ensuring human well-being for our communities. We invite all people in all islands, as well as the international community to join us in our endeavour based on peace, mutual responsibility, cooperation and respect of the ethical values and cultural backgrounds of all.

To this end, we shall create a framework enabling us to engage actions that we consider as priorities and commit ourselves to:

Commitment 1

(a) Provide a stable framework in accordance with our institutions, laws and procedures to promote and strengthen inter-island and international cooperation both for progress and peace.
(b) At the local level, provide each island or island group with an identified focal point equipped with the available low-cost telecommunications in order to implement the envisaged networking and cooperation strategies. The focal point shall also play the role of a forum within every island to enable the participation of all public and private actors in discussing and sharing ideas and envisage present issues and future options for a common benefit.
(c) Create suitable cooperation frameworks among all public and private actors involved in making sustainable development, supporting the necessary sensitization and information actions among islands.

Commitment 2

(a) Focus our efforts and policies to address the endemic problems of island life. These efforts should include the provision of education, employment and livelihood, primary healthcare services, including reproductive health care, safe drinking water and sanitation, adequate shelter and participation in social and cultural life. A special priority shall be given to the needs of elderly, women and children who often bear the greatest burden of islandness and to the needs of vulnerable and disabled persons.
(b) Ensure that people living on islands have a facilitated access to productive resources, including credit, land, education and training, tourism knowledge and information, as well as to public services such as in and off-island transports and participate in decision-making that would enable them to benefit from expanding social and economic opportunities.
(c) Ensure that national and local government budgets and policies are oriented, as necessary, to meeting islanders’ basic needs, reducing inequalities and targeting sustainable development as a strategic objective.
(d) At the international level, we shall strive to cooperate with and assist islands regions of the European space especially in Eastern Europe and Southern Mediterranean, which are still at a developing stage. To this end, we shall encourage the European Communities and other relevant international agencies to support measures for the achievement in a sustainable manner of equal opportunities for the progress of these islands and the satisfaction of basic needs for their people.

News from and about Islands

Commitment 3

(a) Develop, promote and support policies to expand work opportunities and productivity in island rural and urban sectors by investing in human resources development, promoting technologies offering innovative options to self-employment and entrepreneurship within small and medium enterprises. Improve access to credit, information and other productive resources and infrastructures taking due account of the informal sector.
(b) Improve the diversification of activities in all sectors, particularly in sensitive areas such as tourism, which should be based on a wise management of islands’ natural and cultural resources, avoiding dangerous specializations, as recommended in the Charter for Sustainable Tourism adopted at the Lanzarote International Conference in April 1995.
(c) Promote and adopt measures reducing the pollution risks and the external dependency on fossil fuel supply improving all existing potential sources of renewable energy, wind and waves, solar, geothermal and other sources.
(d) At the international level share information on successful experiences and promote among islands joint R&D project in order to optimize results as well as appropriate scale-economies.
(e) Take advantage of all potential synergies to promote inter-islands joint ventures in all productive sector and services including tourism and transports.

Commitment 4

(a) The quality of the natural environment depends on the people’s attitude towards it. We shall therefore promote and diffuse within all members of our island societies a better knowledge and understanding of the specific features presented by their natural heritage. To this end, comprehensive curricula should be adopted at all levels in our teaching centres, for we believe that youngsters are the foremost vehicle to spread a nature-friendly culture among all.
(b) Share and diffuse successful educational and sensitization experiences including effective pedagogical tools and curricula.
(c) Promote regulations for the protection and optimal use of natural resources together with technical and administrative measures to reduce the environmental impact of human activity, including liquid and solid waste disposal and possible reuse for productive purposes.

Participants

- Island Authorities and Local Government representatives;
- Managers and others in charge of island programs;
- Islands Associations and Institutions Chambers of Commerce and Industry;
- People in charge of private and public enterprises;
- European Island Networks;
- International Organisations.

Contacts

INSULA – International Scientific Council for Island Development
1, rue Modis, Maison de l’UNESCO, 75015 Paris, France.
Tel: 33 1 45.68.40.56; Fax: 33 1 45.68.58.04
e-mail: eurisland@insula.org

Conseil Insulaire de Menorca
Cami d’est Castell n° 28, Minorca, Balearic Islands, Spain
Tel: 34 71 35.15.30; Fax: 34 71 36.61.99
email: jgehra.cim@ibitel.es

Website of the Conference: www.insula.org
**Environmental Profile of the Small Italian Islands**

O. Rossi, M. Vezzosi, G. Zurlini and A. d’Ayala

In the last few decades small islands and their many problems have attracted the interest of scientists and politicians. Since 1973, UNESCO, with its MAB programme, Ecology and Rational Use of Island Ecosystems, has coordinated and given common perspectives to the many research projects concerning islands and archipelagos scattered all over the world.

It is worth mentioning some of them here: the Aeolian Project (Italy), the Gole Model (Mafia), the Halik Project (Greece) and the Formentera Plan (Spain) in the Mediterranean basin; the Syrian Ecoplan (Spain) and the “Îles du Ponent” Project (France) in the Atlantic; the Bali Project, the Hong-Kong Pilot Research, the Eastern Fiji Project in the Pacific Ocean.

Each small island or archipelago, has, of course, its own specific environmental and socio-economical features. However in confronting the problem of development, common to all these environments, the same general question is raised, i.e. how to conjugate economical growth with preservation of the specific natural and cultural heritages of each island and archipelago.

UNESCO has organized several international seminars in order to promote intercomparison of methods and results obtained by the different research groups involved.

In the light of these comparisons, certain fundamental and general recommendations valid for development policies of small islands were addressed (UNESCO, 1987).

### Promoting Innovation

**Conditions** such as exclusion and isolation can be overcome effectively by fostering initiatives for introducing technological innovations suited to the characteristics of these ecosystems (best available technology approach), where strategic resources like power and water are so often lacking. These innovations, however, should be related positively to human exploitation activities (agriculture, tourism, fishing etc.) of the different environments.

### Integrated Management

Obtaining a rapid but balanced social and economical development may involve, among other things, a re-thinking and re-qualification of tourist activities, still considered by inhabitants of the small islands (e.g. Vulcano, Ibiza etc.) as the only remunerative activity.

Actually, the recent overwhelming touristic development of many small islands is subjected to unpredictable fluctuations of demand on the international market. Tourism should thus be integrated and supplemented by other activities, selected according to each individual case, but conceived and managed in an up-to-date way.

### Long-term Planning

Social and economical "growth" is long-lasting not only when based on the exploitation of many different resources, but also, and above all, when it respects the environment in its cultural and naturalistic characteristics (traditions, folklore). The attraction of many small islands lies essentially in their natural, scenic and cultural aspects. If these qualities are compromised, then growth has no future.

### Collaboration

When faced with problems related to a small island, scholars carry out research on various environmental compartments, and suggest possible alternative development plans based on data, theories, projections and models. Scientific plans must however always correspond to and meet residents’ needs and expectations. Without this correspondence, even a project highly favoured by the experts will be refused by residents and would prove to be unrealizable.

In the light of past experiences this issue appears particularly critical. The lack of collaboration between scientists and decision makers or, more simply, the non-involvement of local decision-makers in the decisional process concerning the direction research should take, and its progress, makes transferring research results to the population in general a difficult and ineffective task. In addition, it undermines the final goal of sustainable development.

### The Small Italian Islands

The thirty-seven small Italian islands, distributed among thirty-six municipalities, eleven provinces and six regions, have a rather stable population of about 200,000 people. To the residents, at least 15 million seasonal tourists (D’Erme and Merlino, 1981) must be added per year. During the last decade however, a considerable fluctuation in the number of tourists was observed.

A profound change is underway in the small Italian islands, brought on by the "spontaneous" reaction of the resident population to conditions of geographical isolation, social and economical exclusion and the abandon of cultivated soil. Some statistics may help to describe this situation:

- people over 65 years of age are on the average decreasing, from 13% in 1971 to 15% in 1981 and to 16.6% in 1991, representing more than 20% of the total population in seven islands (Fig. 1);
- children under 9 years of age are on the average decreasing, from 10% in 1971 to 8% in 1981 and 6.5% in 1991, representing less than 5% in six islands (Fig. 1);
- workers in the primary sector (farming and fishing) decreased from 6% in 1971 to 4% in 1981 and 1991 (Fig. 1);
- empty or abandoned houses are increasing from 27% in 1971 to 30% in 1981 and to 44% in 1991, representing more than 50% of the total houses in thirteen islands (Fig. 2);
- houses lacking bathrooms were at 60% in 1981 and 52% in 1991, i.e. more than 70% over six islands (Fig. 2);
- people employed by tourism are increasing, from 11% in 1971 to 13% in 1981, and to 19% in 1991 (Fig. 2) with more than 20% in six islands.

The growing demand for tourism has opened new opportunities for income and employment to islanders. At the same time, tourism, and especially mass tourism, is causing damage to the natural and cultural heritages of these very fragile environments. As sample polls show (Cavallo and Macaronni, 1982; Cavallaro and Taviano, 1987; Giavelli et al., 1987), tourism in the small Italian islands seems based mainly on the image of the island as a place where nature remains uncontaminated and direct contact with natural phenomena and rhythms is still possible.

The natural and scenic heritage of the small Italian islands is unique, and should be protected by specific management policies as a main environmental quality objective.

It must be emphasized that whatever socio-economic development policy may be promoted and implemented, it should recognize the need for preserving and improving this heritage by setting environmental quality criteria to be respected.

The main aim of such policies should be the promotion of sustainable management of natural and cultural resources in order to main-...
tain and if possible enhance the environmental offer to tourism.

As regards the different meanings of the sustainability concept when referred to and applied to small island problems, an excellent review is given in Beller et al. (1990).

In our opinion, a promising starting point for supporting decision-making processes concerning sustainable development in the small Italian islands - and applicable to other islands as well - might be a general methodology, based on Geographic Information Systems (GIS). Through GIS technology, it is then possible to:

- integrate all relevant island information, related to the important facets of sustainability as a first general goal;
- define clear and realistic environmental quality objectives and, in turn, a set of environmental quality criteria at the operational level referring to ecological sensitivity, human pressures and environmental vulnerability for establishing the environmental standards needed for maintenance and preservation purposes. Such standards must be adapted to the evolutive traits of the environmental systems and lend themselves to being modified and substituted so as not to lose significance;
- implement a Decision Support System (D.S.S.) which, in case of uncertainty on the part of the island's decision-makers, can clarify the possible effects of present and possibly future total human pressure (including touristic activities) on ecological sensitivity and environmental vulnerability.

An initial example of this approach to an operational definition of sustainability with reference to one of the thirty-seven small Italian islands, i.e. the Salina Island (Aeolian Archipelago, Italy), is described in the following.

Salina Island

In the eighties the island of Salina (Aeolian Archipelago, Italy) was investigated from the geological, ecological and socio-economical points of view. Reviews and further references regarding results can be found in Guavelli et al. (1987) and Rossi and Giavelli (1990).

This research was promoted and funded by UNESCO and the Italian Ministry of Education.

Salina was considered as a prototype in order to explore interrelations between the development problems of small islands and the conditions needed for conserving the natural and cultural heritage.

In 1991 the European Community Commission proposed to all member states a new methodology for identifying and recording conservation sites of importance to the Community.

This methodology, established within the framework of the CORINE BIOTOPES programme, is fully described in an official manual where a hierarchical list of identifiable sites (also called habitats or environmental units) at the Community level is given (EUR, 1991).

This methodology has been officially accepted and adopted by Italy as well as by all the European Community member states and its application to the Island of Salina is, to our knowledge, the first example in Italy of a real case study.

The relevant data and information already collected by the research projects quoted earlier concerning the Salina island were used. As a result, 120 environmental units fully corresponding to typologies in the CORINE Biotopes list were identified for the Island of Salina (Fig. 3).

The complex mosaic shown in Fig. 3 illustrates the great resolving power of this approach. Such identification is the necessary starting point for evaluating ecological sensitivity and vulnerability in the face of new hypotheses on the touristic development of Salina.

Indicators are selected both from those usually adopted by the Italian Statistical Institute (ISTAT) in deriving statistics on man's pressure (habitation density, hotel receptivity, economically relevant cultivations), and by considering the road network, controlled and uncontrolled waste dumping sites and coastal urban discharges. Indicators are tested for independence and provide a score for each environmental unit within a closed interval, covering all the possible outcomes. Man's pressure coming from surrounding units is also considered as a component of perturbations in each environmental unit.

The information layer on man's pressure is combined, in the environmental information system, with that of structural degradation as indicated, for instance, by landslides, subsidence, erosion, to produce the information layer on overall degradation.

As regards ecological sensitivity (Fig. 5) plant and animal population traits regarding rarity, sensitivity to man's presence and activities, and recovery time after interference considered. The tendentially uniform but relevant trait of ecological sensitivity at present greatly exceeds the limits of the terrestrial reserve and interests also cultivated soil.

The two aspects of Nature, the concentrated (Natural Reserve) and the more extended forms (cultivated and abandoned soil) are not much different as far as ecological sensitivity is concerned, on the contrary, they are strictly linked to provide an unique environmental system. This functional interdependence is fundamental to the environmental beauties of Salina and its great attraction for tourists.

Mapping of ecological vulnerability of Salina in given in Fig. 6 and refers to the environment's pre-disposition to being endangered. It depends both on intrinsic environmental sensitivity and man's pressure. The overall vulnerability depends on physical-geomorphological degradation.
The Environmental Profile of the Small Italian Islands

and ecological sensitivity, as well as on the intensity of man's pressure. The ecological vulnerability for each environmental unit (Fig. 6) is derived as the product of the intensity of man's pressure by its coefficient of ecological sensitivity, deduced from the map in Fig. 5. Ecological vulnerability is particularly high for marine phanerogam meadows, because of their intrinsic fragility and their fundamental role as "nursery" and "shelter", essential for the reproductive processes and the life cycle of almost all marine littoral plant and animal populations, as well as coastal bird species.

Following this approach, environmental quality criteria can be set up by establishing levels of vulnerability that can't be exceeded in order to meet preservation goals, and by taking into account the possible temporal variation of ecological sensitivity (spring, summer, autumn, winter) in relation to human pressure (tourism).

All this information is processed according to two points of view, to give an up-to-date insight into the environmental situation and to produce information on risks and potential impacts on environment, due to the variation of disturbance sources and their possible interactions of a synergic or antagonistic type. By taking into account temporal trends of a demographic and socio-economic nature (Saliari and Rossi, 1993), estimates on future impacts from either a qualitative or a quantitative point of view can be derived, and the possible progressive withdrawal from desirable environmental quality criteria can be evaluated.

Some hypotheses for the development of Salina can thus be discussed with reference to maps shown in Figs. 4, 5, 6, in order to make a first-glance assessment of their environmental compatibility. Indeed, looking at the entire Island of Salina, it turns out that available spaces suitable for new touristic structures and infrastructures are quite limited. These spaces can be represented by narrow corridors very close either to the Natural Reserve or to the coast. Thus, suitability of these areas for new tourist settlements can be carefully evaluated, by taking into account previously presented maps and considering that it is essential to choose among areas having low ecological sensitivity and vulnerability. In the light of these environmental constraints representing essential environmental quality criteria, some possible settlements for the Island of Salina could prove to be critical since they would interest areas where vulnerability is low but ecological sensitivity is relevant.

An Environmental Information System

Experience gathered on the island of Salina environmental information system, along with providing useful information to decision-makers, indicates the need for a wider research project aiming to develop an environmental information system as a decision-supporting tool for protecting small island environments and related coastal areas.

To extend such a research project to the all thirty-seven small Italian islands, a multi-stage approach could be used based on calibrating ground-based data and information, and remote sensing data, over selected training fields at ground of well-known nature.

The creation of the environmental information system must involve decision-makers and local inhabitants every step of the way. Without this involvement, and the acknowledgment that any choice related to preservation and development must distribute advantages and disadvantages as uniformly as possible among the inhabitants, environmental information systems would be completely useless. On the contrary, such system can be the basis for furthering exploitation of the cultural heritage, favouring technological innovation compatible with the environment, making rational methods available to present management, and offering image-promoting opportunities so as to re-instate particular local vocations.

Those most obviously interested in the development of decision-supporting systems are decision-makers, planners, local communities and researchers from public and private companies. Within the framework of a more general environmental information system based on GIS technology, one of the main objectives of the research project should be to train personnel in user-friendly computer programs for effective decision-supporting systems for resource management of fragile environments. A bibliographic data base regarding literature production (reports, books, magazines, articles, theses, reviews, projects etc.) on insular environments, should also be considered and periodically updated within the general environmental information system. To complete the project, a computer-aided "interactive training" program for tourist agents, local administrators and community service managers should be implemented for the best possible use of natural resources, existing services and tourist infrastructures.

Since the limited extension and the degree of isolation of these ecosystems imply a strong interdependence of those processes that permit their long-term maintenance and survival, an experimental phase is needed for calibrating technical and operative aspects of the project itself. That will also be reflected by the organization and management of data and information within the environmental information system as a whole.

The implementing of a prototype that may, to a certain extent, be "exported" and applied to various environmentally fragile situations, entails a thorough knowledge of the processes that characterize each insular environment. That will ultimately give rise to an information system actually based on the island's natural potentials, and enable the setting of realistic environmental quality objectives and criteria that meet the inhabitants' real needs.
Sustainable Development and Waste Management in Small Island States

Naresh C. Singh

Small island states in this paper are defined broadly according to the criterion used by the Commonwealth Secretariat as those with a population up to 1 million (Commonwealth Secretariat, 1986). The basis for this choice of criterion was the observation that restricted human resources can be a crucial constraint on a country's overall capacity to function effectively as an independent member of the international community. That study also concluded that although composite criteria combining population with other indicators like national income or land area have sometimes been used to delineate a special grouping of small island states, no accepted classification on this composite basis had emerged. Jamaica (population 2 million) and Papua New Guinea (population 3 million) were included "because they share many characteristics and also maintain integral links with all the small island states in their respective regions".


Growth in the smaller Caribbean Islands (Beller, 1973) has used an area of less than 10,000 km sq. and a population of less than 500,000 as the criteria for the smaller Caribbean islands.

Although somewhat different, these criteria are of a similar order when compared to international scales, and are enough to give us an adequate concept of the scale at which we are working.

The small island states of the world are largely located in the Caribbean, South Pacific, Indian Ocean and the Mediterranean.

The intrinsic linkages between economic activity, waste production and sustainable development provides the framework for the paper. Accepting the commonly used criteria of smallness and considering environmental issues in their development context, the paper examines the waste management issues of small island states.

The contribution of the major economic sectors of small islands to waste production and pollution are summarised. The biophysical and the economic factors governing the waste assimilative capacity of the environment are dis-

References


D'Erme C. and Merlino A., Elementi per una seconda serie di proposte d'intervento secondo Progetti Obiettivo, Cassa per il Mezzogiorno, IX Ripartizione: Studi e ricerche. Roma, 1981.


"The other side of paradise", reproduced from Moving Pictures Bulletin (TV, April 1994). Not everything is romance, palm trees and sandy beaches on small islands.
Sustainability Development and Waste Management in Small Islands

cussed in a generic manner and it is concluded that all relevant factors of small island systems point to a necessary shift from emphasis on manufactured output, to activities with higher informational content and services as the basis for sustainable development.

Small Island States

Small island states which would be considered collectively here, have several similarities but also show drastic differences. The similarities include small land area, narrow natural resource base, fitted human resources, diversified economic structures, small domestic markets and the high relatively openness of their economies i.e. high ratio of external trade with respect to gross national product.

Differences include the influence of many territories climate, different extents of the similar characteristics they share, topography, soil type, literacy rates, culture and infrastructural development.

Nevertheless in a global society, the commonalities among small island states are great enough for a useful collective consideration of their needs and problems to be attempted.

Development Dilemma

The fundamental question of development in small island states is how much of their apparent economic growth as measured by traditional indicators such as GNP is sustainable as well as how much contributes to development. In this context, development implies change leading to improvement or progress in the lives of the majority of the people. An economy which raises its per capita level of real income over time but does so without making any transformation in its social and economic structure, is unlikely to be said to be developing.

As is much debated currently, the GNP criterion is very misleading and is virtually inapplicable to the measure of the development process in small open economies. If pollution damages health, and health care expenditures rise, that is an increase in GNP - a rise in standard of living - not a decrease. Depletion of natural resources is capital depreciation. Yet depreciation on man made capital is a cost while depreciation of environmental capital is not recorded at all (Pierce et al, 1989).

In small states, the people and their narrow natural resource base: land, sea, rivers and forests is essentially what comprises the states. Their economies are heavily dependent on imports for basic necessities and upon exports for income and employment. These economies are highly susceptible to and sometimes held hostage by events and policies taking place within their own and much larger trading partners. Otherwise they are unwilling captives yielding to the dictates of the multilateral lending facilities, who revert to the use of inappropriate measures of achievement and inadequate frameworks of analysis.

The economies of these countries cannot be analyzed on the premises of (i) a free and unfettered market for all the factors of production, (ii) a free movement of people, capital and income, (iii) prices determined in the market place, (iv) the available surplus determining the level of institutional supports the people enjoy. The "distortions" (as economists call them) from the ideal are much greater here than elsewhere (Beller, 1996).

These distortions include excessive dependence on foreign aid, duty free or preferential access to former colonial masters and investment and tax treaties with dominant trading partners and repatriated funds from relatives overseas.

Environmental Problems

The environmental problem of the small islands are in large part comparable. These problems can be illustrated by those currently being experienced by some of the Caribbean and Indian Ocean islands.

The priority symptomatic issues of environmental degradation occur in their coastal zones. These include threats to coastal water quality and coral reefs from sewage, petroleum and industrial discharges, beach erosion, destruction managed either by pollution, garbage dumps or deliberate clearance, unplanned and uncontrolled hotel constructions on beach fronts, construction of marinas and deep water harbours and increasing visits by cruise boats which leave little behind but debris and sewage.

At the same time the coastal zone supports the bulk of the community itself. It also provides the air and sea ports, and major transportation routes by road and sea.

It is the receptacle of the consequences of land based activities such as agriculture resulting in run off containing eroded soil and pesticides and fertiliser residues as well as industrial and domestic wastes. Indeed for small islands the entire country is effectively a coastal zone.

Other major issues include solid waste management, drinking water quality control, vector control, management of toxic and hazardous wastes, orderly land use planning and co-ordination, for coastal and land management, disaster preparedness, preservation of genetic resources, dumping of externally generated hazardous and toxic wastes, oil spills, housing and human settlements, preservation of cultural archaeological sites, historical resources and air and noise pollution.

The root cause of these problems are flawed development models which are either forced on the small states or which they themselves embrace unwittingly. Such development models have policy spin-offs in the major economic sectors of these states. For example, mono-culture agriculture is driven to increase yields and quality by ever increasing inputs of fertilisers, pesticides and credit to the point where the biophysical and economic fabric of the sector is undermined. Agricultural run off loaded with eroded top soil fertiliser and pesticides drain into coastal and marine environments where it can have severe deleterious effects on the coastal marine sectors necessary for tourism. One economic sector is thus forced into conflict with the other. This might be avoidable in a large country where multiple and diverse activities are not forced into such close biophysical proximity.

In other cases no articulated development model is pursued. Development is hoped for, and when it happens it proceeds, with little if any foresight, sometimes in a self defeating manner. Take for example a stretch of perfect beach front property. Before long, several hotels are permitted. One does not take into consideration the environmental impacts produced by the sewage discharge of the other. Soon the beach becomes unfit for recreational activity and the hotels lose their business, having destroyed a prime resource.

Several other examples could be given, but the point is made. Inappropriate development caused environmental degradation and environmental degradation constrains development. This is the so called environment and development nexus. Small states need to clearly define their development goals taking into account the opportunities and constraints presented by their natural and human resources, their indigenous social and cultural values and strengths; as well as the forces of the market place to domestic and international, before embarking on "new paths to progress".

Waste Generation

As would be expected wastes generated in small economies would be relatively small in quantity but their diversity is not necessarily reduced in proportion. The range of wastes produced in the Caribbean and some major pollution concerns are illustrated in Appendix 1.

The extent of pollution resulting from a given type and quantity of waste is a function of the assimilative capacity of the environment into which that waste is discharged.

Assimilative Capacity

The environment has ultimately to act as the receptor for the wastes generated by economic activity. Experience and information date, combined with the projections of computer simulation models suggest that this environmental pollution capacity, though variable is finite, consistent with conditions supportive of life and related functions as we know them. Sustainability both biophysically as well as economically, demands working well within this finite limit.

In biophysical terms, the environmental pollution capacity is a function of a complex set of transport and transformation processes occurring within and among the environmental compartments (air, water, land, biota) as well as the relevant spatial and temporal scales. Depending on local variables, appropriate physicochemical measurements put into suitable simulation models can give reasonable estimates of how much waste a particular environment can accept before a certain standard is exceeded. However the natural ability of that environment to assimilate waste, that is, recycle it for reuse within its own systems, is variable and difficult to assess.

Traditionally, it has been assumed that air, water and soil are in the public domain and that these me
Sustainable Development and Waste Management in Small Islands

The states in question are characterised by small size, limited resources and vulnerable life support systems. It must be abundantly clear therefore that sustainable development in small islands must have a large component of informational activities and services rather than of manufactured output. In the short term, however, guidelines on the appropriate levels of treatment, the method to be used, the characteristics of a disposal site vis-à-vis the characteristics of the waste to be disposed of, must be developed and implemented urgently. This is necessary because of the possibility of irreversible damage. The most urgent cases for attention might include landfilling of solid wastes and ocean outfall of sewage disposal.

Sustainable Development

Mission Statement. "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987)

Attempts at operationalising the mission statement. "Living of nature's interest and not its capital" "Improving the capacity to convert a constant level of physical resource use to the increased satisfaction of human needs."

Constant Natural Wealth Concept. That the next generation should inherit a stock of wealth comprising man-made and environmental assets no less than the previous generation.

Definition

Pearce et al. (1989) state: "We take development to be a vector of desirable social objectives, that is a list of attributes which society seeks to achieve or maximise. The elements of this vector might include:

- increases in real per capital income;
- improvements in health and nutrition status;
- educational achievement;
- a 'fairer' distribution of income;
- increases in basic freedoms."

Sustainable development is then a situation in which the development vector does not decrease over time.

Much of the sustainable development literature has confused definition of sustainable development with the conditions for achieving sustainability. A sufficient set of conditions is likely to include, for example, institutional requirements for implementing sustainable development policy and it may even require systematic changes in social value. They advocate the key necessary condition as "constancy of natural capital stock."

Waste Management

One of the features of sustainable development including those appropriate to waste management must address immediate as well as short, medium and long term needs. A policy is usually a goal seeking series of actions designed to satisfy objectives normally defined by national governments. Proper policy formulation procedure should include the analysis of assumptions, definition of priorities and comparison of alternatives (O'Brian and Sewell, 1981).

Environmental problems are not confined within political, administrative or economic boundaries and as such environmental policies need to be formulated and implemented at different spatial scales including local, national, trans-boundary and international. The international dimension is particularly important in the small island regions of the world, both intra-regionally and extra-regionally, in view of potential distortions in economic comparative advantage, external trade flows, pricing policies, sector resource allocation and siting of industry. For these reasons, it would seem advantageous for each month to make a concerted effort in developing a regional policy framework for sustainability generally and for waste management more specifically. A global co-ordinating and informational exchange system could then link these small island regions.

Conclusion

Small island societies are not yet suffocating from their own wastes as is happening in several "industrialised" countries which have depended on manufactured output as their basis for economic growth. If we ape their misguided path based largely on considerations of mechanical efficiencies and disregard for thermodynamic limitations our fate will be similar, almost certainly worse.

Ours is the opportunity for a timely shift from a material and energy based economy to one with a higher content of information, knowledge and services. During the transition we must set certain minimum standards and guidelines and invoke the precautionary principle whenever in doubt.
APPENDIX 1

POLLUTION CONCERN OF WASTE GENERATED BY ECONOMIC SECTORS IN THE CARIBBEAN

<table>
<thead>
<tr>
<th>ECONOMIC SECTORS</th>
<th>WASTES</th>
<th>CURRENT PRACTICES</th>
<th>POLLUTION CONCEPTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGRO-INDUSTRIAL/FOOD RELATED ENTERPRISES</td>
<td>Sugar, rice, fruit juices, spices, jam, jelly, milk and meat, fish, edible oil, coffee, animal foods</td>
<td>Thermal effluents and suspended solids, effluents, hagnoise, rice husk, oil, seed kernels and shells, inks and adhesives</td>
<td>Water pollution damage to aquatic life. Air pollution respiratory irritants.</td>
</tr>
<tr>
<td>MINING QUARRYING &amp; RELATED MINERAL PROCESSING</td>
<td>Dust, noise, red mud, mercury, cyanide</td>
<td>Bagasse and rice husk are recycled to some extent as fuel. Liquids are largely discarded into water while solids are burnt</td>
<td></td>
</tr>
<tr>
<td>HOUSEHOLD CHEMICALS/CLEANSING AGENCIES</td>
<td>Phosphates, pesticide cans, CFC’s glass containers, trichloroethylene</td>
<td>Liquid discharged as greywater, solids in household garbage, CFCs into atmosphere.</td>
<td>Etroporphication of water bodies contribution to ozone depletion.</td>
</tr>
<tr>
<td>CONSTRUCTION INDUSTRY &amp; FURNITURE MANUFACTURING</td>
<td>Dust, organic solvents/vapours, debris, resins</td>
<td>Pit burials, municipal solid waste dumps.</td>
<td>Air, soil and ground pollution. Respiratory irritations.</td>
</tr>
</tbody>
</table>
Utilization of Used Tyres in Civil Engineering: The Pneusol-Tyresoil

Nguyen-Thanh-Long

Old tyres constitute a waste with excellent mechanical properties and are available in quantity in all parts of our countries. Many of our islands which have many tourists, cars, trucks, varied engines, and so on, have a lot of used tyres.

While old tyres do not contribute directly to pollution (unless they are burned in the open air), they affect our environment in the long term because they are not biodegradable.

There are different processes to valorise this waste and Pneusol-Tyresoil is a particularly interesting one in civil engineering.

The first research in France on the use of old tyres to reinforce soils was done in 1975 and led in 1978 to the submission of a report to the Délégation Générale à la Recherche Scientifique et Technique, Pneusol-Tyresoil, a combination of soils (natural, artificial or others wastes) and tyres that cannot be retreated; they may be whole, partially cut up (one side-wall removed), or completely cut apart (into two side-walls and a part-tread).

Today more than 500 structures have been built in France, 12 in Algeria, in the United States of America, in Norway, in England, in Germany, Romania— and even in Rwanda. They cover a wide range of civil engineering applications mainly in order to reinforce earth structures, at a lower cost than conventional technologies.

On the Réunion Island many structures of Pneusol have been built for protection against slopes, waves erosion, falling rocks, landslides. We expect that this material can be very useful in our islands in civil engineering applications.

Our paper deals with the presentation of some important structures using Pneusol that it is possible to accommodate immediately in all of our islands.

Retaining Structures

The reinforcement of the embankment consists of passenger-car tyres of which both side-walls have been cut away. The tyres, tied together by rot-proof straps, are assembled into layers, which are then placed in tiers (0.35 and 0.50 metres apart) on the compacted embankment (see photograph below).

The Bussang Pass, in 1987, was the first large, major site on the national network to use this material. This site was used for the development, in a real-life situation, of the "technologies" of various potential applications of Pneusol: six hundred meters of Pneusol walls ranging height from 2 to 7 meters were built (see photograph on following page).

Some of them even used a lightened structure ("light" Pneusol). This technique is substantially the same, except that:

- uncut truck tyres are used;
- they are joined together by metallic parts attached to the side-wall (for speed of placement) or by ties;
- each layer of tyres is covered with a non-woven geotextile. The voids thus created lighten the embankment, and the linked tyres contribute to its reinforcement. The density of such a material is of the order of 8 to 10 kN/m3 and depends, of course, on the thickness of the intermediate layer of fill and also on the density of the fill itself. For example a Pneusol with clinker (an other waste) has only 5 or 6 kN/m3. Actually many slopes sliding reparation have been made with "light" Pneusol of different kinds of fills (gravel, clinker, pozzolana,...). "Light" Pneusol is extremely cost-competitive.

In all, 55,000 passenger-car tyres and 2,000 trucks tyres having a combined weight of 500 tons and 1,612 m² of facing (693 concrete slabs) were used for the widening of the Bussang national road.

Reducing Earth Pressure

The first structure of that kind built in 1986 is a cantilever retaining wall fifty four meters long and five meters high founded on two rows of piles. Before filling behind the wall, the contractor became aware that the shell of the wall was too thin (see photograph right).

"Heavy" Pneusol was used to relieve the active earth pressure and also to eliminate tensile forces on the piles. It was made of treads arranged in layers and tied together by polyester taps. Since the fill inside the treads exerts no active earth pressure and is highly confined between two layers, the Pneusol mass, provided that the spacing between layers is small, behaves like gravity wall made up of thousands of tiny gabions stacked one to another.

But the most used structure is that of the Fonderie Wall. One hour before work to widen a heavily travelled road was begun, this 18th Century wall was classified as an historic monument, so it could not be demolished. Luck had it that the whole site lay outside of the right of way of the new pavement. However, a retaining wall near of the old foundry, of a very doubtful stability was right at the base of the embankment of the new road. Being classified, it could not of course, be reinforced from the outside. It is made up of more or less closely spaced blocks. The historic wall was accordingly lined, inside, with pressure-reducing Pneusol. The Pneusol placed behind the wall consists of layers of truck tyres. Equipped with soil sensors, it gives very good results. (Photograph on next page).

Creation of Arching

All builders know how to reduce overloading rigid concrete pipes under a large depth; they incorporate a flexible material with a lower modulus than the fill.
The Utilization of Used Tyres in Civil Engineering

Reducing active earth pressure with trucks tyres.

So the French authorities have conducted some experiments to relieve the stress concentration on underground culverts and quantify the arching created by the use of Pneusol (Photograph below).

The Monistrol work in Haute-Loire, built in 1985 which is 137 m long, as a span of 10, and buried under 13 m is the first application of this type.

The numerical modelling for analysing the elastic and elastoplastic behaviour was carried out thanks to a general-purpose finite element software (CESAR-LPC). The numerical results are obtained in fair agreement with the experimental observations.

Since then, more than 300 other structures using this technique have been built in France, twelve in Algeria, two in Spain.

Energy Absorption

The idea of Pneusol as an "energy absorber" springs from a common place observation of daily life. One often sees tyres stored casually against garage walls. And tyres are used at tricky corners on motor racing circuits to slow the occasional car that spins off the track. The test results showed that the energy restitution coefficient of Pneusol is very low, about 0.10 (this is the ratio of rebound height H of a falling weight to height HO from which it was dropped).

A real test is performed on three layers' Pneusol built on a concrete roof (about 25 m²) supported by twelve metallic columns equipped with strain gauges with a 2 tons block falling from 40 meters height. Experimental results show that the Pneusol has a very good absorption power.

Other Applications

Pneusol is a combination of two components, tyres and soils. So it is possible to build "any structure" you want depending on its destination. For example, a "light" Pneusol is a good material for the subgrade of a road in cold countries again frost because it has many voids (Quebec).

It is sometimes difficult to ensure the stability of structures built in water, because the soil must be held in place without disturbing the flow of water along the embankment, since this may lead to erosion of the banks.

The use of Pneusol with a suitable fill ill (gravel), possibly in conjunction with a grid at the surface, would first of all make it possible to absorb current and wave energy and then to apply to ground surface a surcharge that would serve to prevent erosion of the banks. The surface grid would prevent the washing away of the gravel and facilitate the depositing of matter in suspension.

Pneusol could limit topsoil erosion by runoff water and removal of vegetation from frequently travelled banks. It could be placed dry or in water, on the bottoms of canals and streams.

For the protection of the Etang du Puits dike we have used 35,000 tyres on edge filled with treated silt (see photograph on next page).

Dossier: Waste Management in Small Islands

Armapneusol-Reinforced tyres soil: 20 meters high!

Conclusions

This paper quite touches all facets of the use of Pneusol-Tyresol as a civil engineering material.

For ten years of experience (the first real structure was built in 1984) some significant findings may be pointed out:

- Tensile tests of tyre parts and soil-tyre adherence have yielded good results.
- The "light" Pneusol construction cost for different sites is quite attractive and compares favourably to polyurethane foam or expanded clay. In some cases (in particular for embankments on unstable slopes), it is possible to compensate for the difference in mean density by doing additional earthwork and using more "light" Pneusol.
- Globally, the Pneusol embankment behaves as an embankment that is reinforced and therefore has cohesion. This cohesion enables it to withstand much larger differential settlements than conventional embankments.
- The presence of the tyres, and the voids they create, gives the Pneusol embankment good anti-vibration, anti-frost and perhaps anti-seismic properties.
- Finally, among the things we are sure of, we may mention the long life of the tyres, their ability to withstand aggression of all kinds (in particular chemical), the simplicity of the process, its universality - the basic materials are available practically on the spot in all countries, and, of course, its ecological character - wastes are eliminated but also made useful in process.

The promising research results, the good behaviour of different structures built (500), ease of use and excellent long-term performance make Pneusol-Tyresol a very good civil engineering material.
**Dossier: Waste Management in Small Islands**

### Bornholm: Green Island in the Baltic Sea

**Jannik Stenberg**

Despite being located closer to the Swedish coast than to Denmark, Bornholm is a Danish island. Its inhabitants are proud of their Danish heritage, and of the 1608 rebellion in which the occupying Swedish forces was overthrown and the Danish king was persuaded to take control once more.

Only 30 km long, the island of Bornholm sits in the Baltic Sea 90 km north of the Polish coast and 30 km south of Sweden. Its northern rocky coast with its granite outcrops is in stark contrast to the fine white sandy beaches of the south, with a central forest area of mixed woodland both dividing and uniting the two. Bornholm's inhabitants depend equally on fishing, agriculture and tourism for their livelihood.

**Green Energy Plan**

In any location, energy supply and consumption has considerable environmental impact and is potentially a major source of pollution. For an island which lacks its own indigenous supply of fossil fuel sources, these issues are magnified, particularly if one of the major sources of revenue on the island is tourism which relies on the beauty and cleanliness of the scenery.

Bornholm has long had a policy of reducing energy demand as far as possible. Its Green Energy Plan includes a number of energy saving schemes, such as the improved insulation of all buildings, calculated to reduce energy consumption by one third; the requirement to use low energy light bulbs by 2010; the installation of solar panels for domestic hot water, and the proposed construction of a photovoltaic power plant.

In the 1980s Bornholm declared a policy to use local energy resources wherever possible. These include solar, wind and water. At present the majority of the island's electricity (65%) comes via an under-sea cable which links Bornholm to the electricity supply network in nearby Sweden.

In its bid to support wind power, the Danish Government produced a detailed technical manual to enable ten local companies with no previous experience of wind turbines to construct the first windmills. Mat wind farm, inaugurated in 1987 north of the town of Hasle, is jointly owned by the municipality and the county council. Today the island boasts a number of mostly privately owned wind turbines. Typically these are private companies formed by a small co-operative of just 50-60 households. By the year 2010, a total capacity of 3MW from wind power is planned.

A straw-fired plant in Nexø, one of several, has been supplying district heating since 1989. There are plans for two further district heating plants in Hasle and Aakirkeby which will be fired by locally produced biomass.

Bornholm's largest town, Ronne, is part-supplied with district heating by the nearby waste incineration plant run by Bofa, a joint venture public company formed in 1986 to co-ordinate waste management policy. Bofa also has the contract for waste collection on Bornholm, and manages the paper and glass sorting operations which process separately collected recyclable material.

**Waste Strategy**

The main thrust of Bornholm's waste policy is to reduce to a minimum material needing to be landfilled. Typically less than 1% of the island's domestic waste goes to landfill. A proposed new landfill site next to the existing one, which is almost full, will provide 30-40 years of capacity, depending on diversion rates to other recovery and disposal routes.

A straw-fired plant in Nexø, one of several, has been supplying district heating since 1989. There are plans for two further district heating plants in Hasle and Aakirkeby which will be fired by locally produced biomass.

In its bid to support wind power, the Danish Government produced a detailed technical manual to enable ten local companies with no previous experience of wind turbines to construct the first windmills. Mat wind farm, inaugurated in 1987 north of the town of Hasle, is jointly owned by the municipality and the county council.

Today the island boasts a number of mostly privately owned wind turbines. Typically these are private companies formed by a small co-operative of just 50-60 households. By the year 2010, a total capacity of 3MW from wind power is planned.

A straw-fired plant in Nexø, one of several, has been supplying district heating since 1989. There are plans for two further district heating plants in Hasle and Aakirkeby which will be fired by locally produced biomass.

Bornholm's largest town, Ronne, is part-supplied with district heating by the nearby waste incineration plant run by Bofa, a joint venture public company formed in 1986 to co-ordinate waste management policy. Bofa also has the contract for waste collection on Bornholm, and manages the paper and glass sorting operations which process separately collected recyclable material.

**Glass Recovery**

Glass collection relies on strategically sited collection containers in public places, to which households deliver their glass. Aluminium drinks cans are prohibited in Denmark and the majority of glass drinks containers carry a DKK deposit. These are mostly returned to retail outlets.

The island's glass sorting plant recovers a very high proportion of whole bottles from the bottle banks. Each working day an estimated 500 whole glass wine bottles are separated for re-use, while the same number of clear juice containers is collected every two weeks, and of clear glass drinks bottles (such as whisky bottles)every four weeks. Broken glass is shipped for reprocessing in Copenhagen on mainland Denmark. In 1994, 400,000 whole bottles were recovered, and 382 tonnes of mixed cullet sold for reprocessing.

**Paper Recycling**

Households have a weekly collection of ordinary refuse which they place in plastic sacks, and in addition a collection every four weeks of separated clean paper. Collection of bulky wastes such as old furniture is also provided and a specially fitted mobile collection point for hazardous materials such as chemicals, paints and solvents visits different towns on the island between two and four times a year, to a prearranged schedule. Householders also have six amenity sites to which they may deliver waste materials themselves. The site in Ronne, at the same location as the waste-to-energy plant, processes 40% of the total 3,000 tonnes of wastes which are delivered to such sites.

**Waste to Energy Plant**

Waste management company Bofa is also responsible for the operation of the 50 tonnes per day Ronne waste-to-energy plant which has been operating since 1991. The Ronne plant supplies 6.2 MW to the district heating system. Waste from 21,000 households (45,000 inhabitants) is delivered to the waste-to-energy plant, as well as additional wastes which result from the influx of around 400,000 tourists during the four month summer season each year. Bornholm has a wide range of hotels and bed and breakfast accommodation, and in addition around 3,000 privately owned summer homes. In 1984, the total input to the Ronne plant was 20,478 tonnes of waste from which 3,500 tonnes of ash and metal remained. Ferrous metal is recovered from the incoming waste and post-combustion from the ash.

Most of the health care wastes from the island's only hospital are burned in the Ronne plant, with special precautions taken to protect the staff. These include the packaging of health care wastes.
into a special box, which is then placed manually into the crane and deposited directly into the furnace. As part of its management programme, Bofa run training courses for hospital staff. In addition, a Bofa employee worked for two months at the hospital, advising on the sorting, handling and packaging of healthcare wastes destined for the waste-to-energy plant.

Batteries
A European Union-funded battery collection scheme was started in 1987, using containers with four compartments. The resulting battery collections were poorly sorted, and it was clear that the four definitions of battery types was too complicated. Since 1989 the battery boxes, which are innovative pack-flat cardboard containers designed by Bornholm architect Jannik Stenborg, are divided into just two compartments. They are widely distributed in shops and supermarkets across the island, and carry simple instructions for correct sorting into two categories: those which are potentially environmentaly harmful, and those which are not. The latter category are disposed of in a controlled landfill on the island, reducing the high costs associated with shipping the potentially harmful types to appropriate off-island disposal facilities. Removal of the batteries from the waste stream assists in keeping emissions from the waste-to-energy plant at low levels.

Organic Waste
A small trial of 100 households was undertaken recently at Bofa’s instigation to evaluate the effects of home composting. The resulting reduction in waste volume was 24%. No decision has yet been taken on the expansion of this scheme.

Plans for the future include a biogas plant which will process organic waste from households, hotels, restaurants and the food processing industry as well as from waste-water treatment plants and from farming. The biogas plant will generate electricity, heat and a fertiliser product for agricultural use. As yet funding has not been agreed for this independent project which would be a further step down Bornholm’s road to independence in energy supply.

Oil Recovery
In a move to discourage the washing out of ships' tanks and discharging oil and oily water mixtures into the ocean, Bornholm has introduced a rule which entitles every ship longer than 24 metres to free disposal for these wastes. An oil separation facility has been constructed alongside the waste-to-energy plant in Ronne. The facility attracts around 2,000 tonnes per year of oil and water mixture, typically in a ratio 45% oil to 55% water. Oil from private motorists as well as from commercial organisations such as garages is also accepted into the processing plant, which uses the reclaimed oil in the waste-to-energy plant’s after-burn chamber and discharges the water after cleaning it.

The Future
A new rule requiring every Bornholm company to provide an annual report of its waste production was introduced towards the end of last year to help with planning for future waste disposal needs. There are also proposals to require everyone to join the district heating network.

Already Danish law has imposed a landfill tax of DKK5/tonne and a tax of DKK6/tonne for waste which is incinerated. Recycled wastes are tax free. These taxes are expected to increase to DKK25/tonne for landfill, and DKK510 for production of hot water only (which is the output from the Ronne plant), while plants producing both electricity and hot water will stay at DKK80/tonne tax level. This is designed to maximise efficiency in Denmark’s mainland waste-to-energy plants.

These rulings may create some problems for Bofa at their Ronne incineration facility as such a small plant, with relatively tiny quantities of waste, could not efficiently generate electricity as well as feeding hot water to the district heating system. However, effective January 1997 a Danish ban on the landfilling of combustible materials is due to be introduced, with a ban on the landfilling of organics also under discussion. Bofa has ensured that Bornholm is already in a strong position to meet these requirements.

---

**Glass Recycling in Remote Areas: The Shetland Islands Experience**

**Mary Lisk**

The Shetland Islands form a unique community at the northern edge of the United Kingdom, some 200 miles north of Aberdeen and virtually equidistant by 220 miles to Bergen in Norway and Thorshavn in Faroe.

The island group consists of over 100 islands of which some fifteen are inhabited and are presently linked by inter island ferry and/or by internal flights. (See Figure 1) From Fair Isle in the south to Muckle Flugga in the north, the islands stretch some 90 miles with a total land area of 567 square miles. Few maps show Shetland in its true position on latitude 69° north, level with the southern tip of Greenland.

Shetland is linked by an overnight ferry (P & O Ferries) with Aberdeen 200 miles to the south. The trip takes fourteen hours. Twice weekly the ship passes via the nearest island neighbours, the Orkney Islands, 50 miles to the south. There are daily flights by British Airways to Aberdeen, Glasgow, Edinburgh and Orkney.

Due to the remoteness of the island group from mainland Scotland the cost of living is high. This is largely the result of freight costs.

The island population is stable at some 22,500, with some 8,000 of these living in, or immediately around, the islands capital, Lerwick, which has grown by a third in the past thirty years with a corresponding decline in the population in the remoter areas of the islands group.

Shetland's traditional industries are fisheries (catching, processing and aquaculture), agriculture, knitwear and tourism but with the construction of Europe's largest oil terminal on mainland Shetland in the 1970s, a number of jobs opened up in oil related activities and the standard of living in Shetland rose significantly. The Shetland economy is currently very dependant on oil related activities which are in the process of contracting.

Shetland has historically, due to its remoteness, developed its own culture and lifestyle; political and economic trends in the rest of Britain are not always reflected here and are often adjusted to suit particular aspects of the Shetland way of life.

Prior to 1990, recycling in the United Kingdom was patchy and lacking in uniformity. In 1990 the Environmental Protection Act placed a requirement on local authorities to submit a Recycling Plan for their geographical area. Following this, and in pursuance of the government set target of 25% of domestic waste to be recycled by 2000, recycling ventures began to blossom throughout the United Kingdom.

In the Scottish islands, however, the relatively small volumes of materials available combined with high transport costs meant that mainland practices via a vis recycling were more slow to develop.

---

**Inter-regional Co-operation**

In 1990, Shetland submitted an application for funding a collaborative island project under an EU Special Action Programme for Inter Regional Co-operation (SAPIC). The islands involved include...
Glass Recycling in Remote Areas: The Shetland Islands Experience

included Shetland, Orkney, Western Isles, Irish islands and Leavos in Greece. The object of the project was to undertake work on specific topics and exchange experience. The topics chosen were tourism and environmental issues and included: protection of reservation systems, coastal clean up, the use of traditional cottages, tourism marketing and recycling.

The Scottish Islands (Shetland, Orkney and the Western Isles), under the co-ordination of Shetland Islands Council, undertook work on two projects, tourism marketing and recycling and produced reports on projects in the islands.

Shetland Glass Recycling: Phase One

In 1990 Shetland Islands Council had commenced work on its Recycling Plan and had not yet appointed recycling officers.

Shetland Islands Council, therefore, approached Shetland Amenity Trust (SAT) – an environmental trust and registered charity established in 1983 with the support of Shetland Islands Council – to protect, improve and enhance buildings and artefacts of architectural and other interest; to provide, develop and improve facilities for the public enjoyment of the Shetland countryside, its flora and fauna; and to assist in the evaluation of the environmental recycling project.

Mr Dick Nickerson, Anti Litter Coordinator with SAT had undertaken research into various aspects of recycling in Shetland in relation to possible environmental projects. In the course of SAT’s research it became apparent that there was much popular support for recycling throughout the island’s areas.

As glass was the most popularly requested form of recycling and glass made up some 10% of the waste stream, SAT commenced a feasibility study in 1991 on the possibility of collecting and shipping glass (cullet) from the three island groups. Glass was also chosen as the material for recycling research because of the British glass industry’s target of one bottle bank to every 5,000 population by 1995 and because of the till relative stability in the glass market within the United Kingdom.

In evaluating any type of recycling project certain criteria must be constantly borne in mind.
1. Public support;
2. A reliable economic and long-term market for that; and
3. A cost effective collection and delivery service.

In SAT’s view factors one and two existed with respect to any glass recycling scheme in the islands, only item three remained to be developed.

Collection and Transport

In island groups, the cost of shipment of material to and from “mainland” is a constant concern as is the costs of internal shipping. The Sheffield Transport Study (1974) had recommended that in rural areas it is important to minimise collection costs. This generally mitigates against a kerbside collection scheme, regardless of the material. It was decided, therefore, that any glass recycling scheme would require to use large glass bank containers, sited locally, which would be moved as little as possible.

Based on the results of a 1991 pilot collection project (from one hotel and ten households) in Shetland, and other national criteria, SAT calculated that 200 tonnes of glass would be likely to be collected within each island group per annum, the annual total for the three islands groups being likely to be some 600 - 800 tonnes.

By 1992, when the SAPIC Feasibility Study was being developed, United Glass – the chief glass market within the United Kingdom – had introduced a segregation policy by colour. The nearest glass plant to Shetland was at Alloa, some 350 miles from Shetland, entailing a substantial loss of glass due to the high transport costs for any transported glass. For this reason, SAT concluded that the most cost effective manner of transport would be to create a deposit scheme first. Further, it was concluded that the most cost effective manner of transport would be to create a deposit scheme first. Further, it was concluded that there was little international market for cullet.

The SAPIC feasibility study therefore concluded in 1992 that, unless subsidised, it was unlikely that transportation of small quantities of glass to the recycling plant at Alloa or any transfer station would be economically viable. Shipping empty bottles to the mainland for re-use would be expensive and not environmentally sound. Because of marketing pressures and cost, it was also unlikely that any of the major manufacturers of soft drinks would be prepared to operate refilling plants in rural communities or island groups.

Investigations undertaken for the project indicated that sea transport, which was the only method of transport available, would be too expensive and therefore unviable.

SAT, therefore, recommended that, as the SAPIC feasibility calculations on bulk shipment to Alloa were seen to be marginal and it was hoped that the glass market might change in its favour, a pilot scheme to collect glass initially in Shetland be commenced in 1992/3 and, if successful, should be expanded to the other island groups. This pilot scheme would receive part EC funding but would, however, require active recruitment and logistical of the local authorities in each area.

Recycling SIC’s recycling staff had concluded that:
1. exporting glass by bulk shipment or in small specific loads was environmentally detrimental and uneconomic;
2. recycling projects which ran at a loss could not be supported in the current financial climate;
3. such projects would likely be held against any development of the recycling ethos in general in Shetland, as they would provide fuel to the “recycling will never pay for itself in a rural area, it’s a waste of money” attitude.

Dossier: Waste Management in Small Islands

In late 1992, therefore, SAT approached Shetland Islands Council’s Environmental Services Department (the waste collection, disposal and regulation authority for the islands) with a view to further discussing/developing a glass recycling scheme for the island.

Shetland Islands Council (SIC) had recently undergone a major restructuration and had appointed (in the post of coordinator) with developing the Waste Disposal and Recycling Plans for the Shetland Islands area. SIC were asked to comment on the major waste disposal strategy - including the role of recycling in that strategy for the islands - well into the 21st century.

Changing Circumstances

For much of 1993 Shetland’s glass recycling pilot remained on hold. A shortage of funding and a lack of cost-effective transport caused for recycled materials delivery to processing plants. By 1993 information was becoming increasingly available on experiments in remote areas of the United States of America where glass was crushed and used locally as a building aggregate amongst other uses and of projects in Spain where local craft glass works were being developed. It was felt that such developments should be investigated with a view to stimulating the local Shetland market and thus completely avoid shipping costs.

SAT’s recycling staff, therefore, commenced investigations, in late 1993, into the details of various trialed uses for crushed glass in America from lawn additives, through neon signs and roadside markers, to road surface additives and concrete products. Whilst SAT’s Project Officer, attended a Department of Trade and Industry seminar on waste glass recy-
Glass Recycling in Remote Areas: The Shetland Islands Experience

In 1994 it was agreed that the mosed SAFIC pilot project for glass collection be substantially altered by developing it as a joint venture project between SIC and SAT - SAT providing the glass collection service by the use of its lorries and SIC negotiating local glass banks sites, buying and providing the local glass banks, providing the storage facilities for the collected glass and marketing the end use of the material.

A local quarrying firm making concrete products agreed to participate in the scheme, providing the necessary crushing facilities and expertise in the handling of concrete based products. In 1994/95 an initial number of concrete planters were produced from collected stockpiled glass. These proved successful and were used as the plinth bases for the glass banks and other recycling banks to be sited locally. The scheme has been further developed in 1996 by the manufacture of a quantity of large concrete litter bins made from a crushed glass/concrete mixture. These are to be sited throughout the islands and will help to provide sturdy, low-cost bins to assist the visual amenity of the area.

In 1996 a crushed glass/concrete mixture has also been used successfultly by Shetland Amenity Trust in floorings for a historic house which is being renovated as a tourist camping barn. This mixture can also be used successfully in paths and surrounding areas. Crushed glass is also currently being used in the manufacture of small scale fancy brick work/containers by the local adult disabled Centre.

Conclusion

Glass recycling, as indeed any form of recycling, requires to be reasonably cost effective and to have a guaranteed market. In remote areas transport costs mitigate against schemes being established on economic grounds. However, lateral thinking on the creation of possible local markets can provide the grounds for schemes to be established and to prove viable.

In many cases, economics of scale i.e. small quantities of materials, high costs of processing equipment, make the establishment of recycling schemes in remote areas difficult to promote. However, where schemes can be piggy backed on to existing businesses either as diversification of product or as a means of further using expensive equipment in its down time these schemes can then generate jobs for existing staff (particularly in times of financial recession) and thus contribute positively to the area economy.

Shetland islands current glass recycling scheme can be viewed in this light. It limits the import of materials (and the use of natural raw materials and energy) it operates without expensive shipping costs and provides added job stability for the work force of the manufacturer.

It is also easily duplicable in other rural areas where - with a little lateral thinking - local markets could also be developed.

INSULA: President of the Parliament of the Autonomous Region of Baleares

Interview with Juan Huguet | Rotger

President Rotger: May I say that we are not experiencing this political and economic integration at the instigation of continental territories. On the contrary, I believe that islands have been pioneers in this universalizing process, and they have done so because they are the first in not wishing to be left behind or "isolated".

A large number of islands - and I am speaking on behalf of the Balearic Islands - is that the situation is self-evident - have created a favourable atmosphere for this process from the competitiveness of the tertiary or tourist sector. I believe that tourism has been and continues to be the best formula for collaboration and for integration, on cultural and social, as well as political and economic grounds.

Tourism has generated a new, more integrated perspective of the European continent, and to a great extent, has made up for the deficiencies in the transporting of raw and industrial materials (which has led to a decrease in agricultural and industrial production) especially as a result of innovation in the tourist service sector.

However, though islands have been foremost in the search for political and economic integration, there remains the risk of dependence on a very narrow range of economic activity.

On the other hand, I consider that we should not go back to political and economic universalization. For this reason, it is essential to underline the need to safeguard the social and cultural peculiarities of each community.
President Rotger: Owing to the limitations of their territory and the fragility of their insular eco-systems, islands must be especially careful not to promote economic activities that may detrimental to the environment.

For this reason, urban growth should be limited and planned with regard to the totality of the territory. Those islands whose main source of income lies in the tourist trade tend to be subject to pressures by speculation from capital originating from continental territories. This is the kind of competitiveness that should be pursued by island authorities. On the contrary, diversification of sources of supply and innovation in economic activities should be pursued, as long as these are not detrimental to the environment.

In order to solve the environmental problems brought by the influx of large numbers of people, it is necessary for community authorities to introduce sound environmental practices. The "polluter pays principle" should be universally applied by community authorities in the case of tourism, and other means of measures, such as the "ecotax", or some similar arrangement. And on the part of both regional and local authorities, special attention should be given to providing incentives for non-polluting innovative activities with the aim of reducing environmental impacts, and to solving the current natural imbalances, by means of water treatment, the recovery of old areas and limitation of visits to fragile nature areas and others measures.

INSULA: Inter-islands co-operation, at least at the European level, can be considered as instrumental in promoting island competitiveness and thereby reducing regional disparities. While at the island level such cooperation is considered as highly necessary, is there a sufficient political will by the national governments or at the European Union level to support such moves?

President Rotger: As you say, from an island perspective, cooperation is understood, not only as a good neighbourliness and fellowship, but also as a primary need for development. Since islands are peripheral territories, the need for them to cooperate with mainland territories is not only understood by many people, but is justified by the fact that many of them cannot afford to develop alone. Very few central governments manage to gauge the difficulties of the physical separation suffered by archipelagos; the extra costs and the financial and transportational difficulties encountered by the islands.

I do not wish to talk about the need for "positive discrimination" for island territories, since this seems like a petition for privileges. I would rather like to refer to the need for the same competitive conditions as those enjoyed by continental territories. This is not asking for privileges; this is asking for "equal opportunities" or a level playing field. Give us the same conditions to start the race at the same time and with the same means as the rest. If not, it becomes a sprint or a long distance race, where everybody is on the same line, except for islands which are placed a few metres back. We'll never be able to compete like this, and we'll never win the race in these conditions. This factor is often overlooked from the centres of power.

INSULA: Mr. Huguet you were the originator, together with the Island Council of Minos, of the idea to organise the "first European conference on sustainable island development". An idea supported by UNESCO's Director General Mr Mayor. What are the expectations of Islands that you expect from this conference especially in terms of concrete follow up?

President Rotger: First, we must make ourselves heard. Isolated voices are simply a murmur that is never adequately understood. Combined voices can become an outcry. And an outcry is heard even by the deaf. Secondly, I think that a European Conference on the Sustainable Development of Islands will make it clear that our territories face the future in the midst of an apparent struggle to satisfy the need for development and the demands of maintaining the natural and ecological balance in our lands. We believe that imaginative formulas that are compatible with economic development and, at the same time, conserve and respect the wealth of the natural and artistic heritage bequeathed to us.

This requires, amongst other things, the reduction of transport costs and the promotion of non-polluting activities and systems for diminishing the pressure that the influx of humans has on the environment, and by reconstructing, or regenerating the landscape and environment, negatively affected by the exploitation of natural resources and the pollution caused by human presence.

INSULA: To conclude Mr Huguet, new lines of action for sustainable Europe, and for Island development, will be set forth at the Minorca Conference to improve the islanders' quality of life. What in your opinion is the role that an organisation such as INSULA, the International Union of Island Development, can play in such an evolving context?

President Rotger: To be a messenger, a defender of islands before all international organisations. In such an interest situation, solutions cannot come from national governments alone, since they must also be adopted by supranational governments. For this purpose, INSULA must be given the power by island representatives to act as their intermediary, to interact with international organisations: UNESCO, the European Commission, the Council of Europe, the European Parliament and so on. And this power should provide INSULA with enough moral and political authority to initiate and negotiate solutions, which are normally entirely excluded from any other forms of development. In other words, may have their own formulas for guaranteeing the well-being and quality of life of islander citizens, whilst ensuring that the development within the industrial, or tourist sectors does not damage the environment, or the archaeological heritage.

"Lemnian Earth": The Earth That Supported an Island

Pho dès Hatzitheodoridis and Ekaterina G. Ohanjanian Chiotakis

The Lemnian Earth

The island of Lemnos can be located approximately in the centre of the northern part of the Aegean Archipelago. It is Greece's 8th largest island, covering an area of 477 square kilometres with a population of approximately 17,610 (1991 census). The island's economy is primarily based on agricultural production and tourism. The extraction site of the "Lemnian earth" is located in the centre of the island in today's Kotelias community. Its exact used to represent the Lemnian earth. For example, Greenland is referred to it as Agio Choma (Holy earth), Agia Geo (Holy earth), Sfragiamese Geo (Sealed earth), while in Latin and French it was referred to as Terra Lemnna, Terra Sacra, Terra Sigillata, Terra Secellae. For over 200 centuries, the island of Lemnos was known throughout the world by the virtue of its "Lemnian earth". This earth, a special sort of clay, was obtained from a specific site on the island and was considered to have therapeutic qualities for a series of diseases. Every travel diary relating to the island of Lemnos made reference to the Lemnian earth as well as to the rituals and sealing practices associated with it. In effect, there was a variety of different names
location is on the flat part of the top of the Mosyklon hill (see photograph right).

The origins of the "Lemnian earth" can be traced back to mythological traditions regarding the island. According to these traditions, the "earth" was discovered by Efeatos, the God of fire and metallurgy who, when falling off his horse and breaking his leg, observed that the earth coming in touch with his broken leg helped to heal it. The interaction between mythological accounts and the "earth"s therapeutic qualities was the driving force behind the consideration of the "Lemnian earth" as a cure (Paximadas, 1982).

In addition, to the mythological accounts, historical evidence exists ascertaining the fact that the island of Lemnos has been volcanic. In fact, the soil and subsoil of the Mosyklon hill is of a different nature from that of the rest of the island.

Among the historical sources regarding the "Lemnian earth", examples are the book entitled Acid Therapeutic Substances written by the well known medical doctor Aretaiou of Cappadocia in the 2nd century BC and the philosopher Theophrasto's study entitled Regarding Stones written in the period between 315-305 BC.

Further reference can be found in the poet Nikandros Thiriaka and the Roman author Pinyus Natural History while the Greek botanologist Dioskourides discussed its qualities extensively in his work entitled Regarding Medical Substances written in the 1st century AD.

Therapeutic Qualities

A large part of our world has known of the therapeutic qualities of the "Lemnian earth" with respect to a number of diseases. Its use for healing purposes can be traced back to the Middle Ages. According to Galenos, the earth could cure the plague and all epidemics. The "earth" was also used as an antiseptic against snake bites as well as in cases of slow-healing wounds. When used as an ointment, the "Lemnian earth" would be used to relieve eye irritations. Mixed with vinegar, the "earth" was said to treat nausea and haemorrhage. Furthermore, it was considered as a general pain reliever and accounts can be found where women were said to drink the earth in cases of severe menstrual flow and in cases of very painful labour during childbirth (Stefanidou, 1986).

Rituals

Dioskourides speaks of elaborate rituals performed by the Lemnian population on the day of the extraction of the "Lemnian earth" around the 1st century AD. Such rituals included the slaughtering of goats, the island's sacred animals, and the mixing of their blood with the earth, for the purposes of creating a seal picturing a goat.

Stefanidou refers to the French traveller Belon who visited the island in 1546, at a time when it was under the Turkish rule. He observed that the extraction ritual of the Lemnian earth was performed annually on the 6th of August, the day of Christ's Metamorphosis. On this day, Greeks and Turks would go to a small church located on the Mosyklon hill. After chanting and prayers, they would visit the excavation site. Fifty to sixty men would dig until they would locate the source of the earth. Then, monks would fill bags with the earth which would be delivered to the Turks.

At the end of the ritual the site would be covered and concealed. The earth gathered would be turned into clay, formed into small balls and sealed (see photograph right). The Turkish commander would send the largest part of the clay to the Sultan and the remainder would be sold to the local merchants for profit. Those present at the excavation site had the privilege of keeping a small quantity for personal use only. The reason why the earth could not be sold for profit was that it lacked the Turkish seal.

At the end of the 19th century, Tozer, upon visiting the island observed that very few individuals would attend the excavation ritual of the "Lemnian earth", while the use of it was limited to the inhabitants of the eastern part of the island. By early 20th century, the use of the therapeutic clay as well as all the rituals surrounding it, had ceased completely.

Islanders at Work

The importance of the "Lemnian earth" can be appreciated by referring to the legal regulations in effect at the time of Turkish rule. According to these regulations, the unauthorised export of the earth was punishable by decapitation, while the sale of the earth without the Turkish commander's seal was subject to a fine.

There are accounts that show that knowledge of the "Lemnian earth" was not only limited to people in Greece. In fact, during the Turkish period, the largest amount of earth exported would end up in the Sultan's private pharmacy in Constantinople. The Sultan was known to offer the earth as a precious gift to his most important and prominent visitors (Filippidis, Konstantas, 1791). The sale of the earth to the merchants was done exclusively by two sources the Sultan's medical doctor in his private pharmacy and Lemnian Turkish commanders. As mentioned before, the sale was only legal if the product carried the Turkish seal. The "Lemnian earth" was sold to the public in the major commercial centres in Europe at very high prices.

Belon was the first to notice that there were different grades of "Lemnian earth" available on the market, which could be distinguished from other grades of earth of inferior quality (see picture left). His observation was based on the fact that many merchants would mix the "Lemnian earth" with the cheaper and of inferior quality called "Armenian earth".

Following a chemical analysis of the "earth" in 1880 and in 1895 by Dr. Dauberry and DeLaunary respectively, it was concluded that the "Lemnian earth" had no therapeutic or other qualities. This was confirmed by a 1913 chemical analysis by Thompson which, unlike his predecessors, used 16th century samples. It was observed that again, no changes existed in the composition or qualities of the earth (Stefanidou, 1986). Recently, however, the qualities and...
Lemnian Earth: The Earth that Supported an Island

use of the clay made up from the "Lemnian earth" has been found to form a necessary ingredient of modern drugs (Paximadas, 1982).

The "Lemnian earth" was perhaps associated with an augmented number of therapeutic qualities. However, it is equally clear that this earth does have some of these qualities. Such an observation is consistent with the important role the earth has played in the medical and pharmaceutical fields for the past 2,000 years.

Lemnian Earth and Tourism

Today the Lemnian community recognises the potential of its "earth" as an exploitable resource for the purposes of the island's tourism industry. In this context, the local community has undertaken several projects for the proper exploitation of its natural resource.

Specifically, a historical monument is to be constructed on the excavation site. Promotional materials (e.g., flyers, photographs and documentaries) will be created informing the public of the history and cultural significance of the "Lemnian earth." Furthermore, the observance of the excavation rituals is to be revived. Finally, thes-festivals will be organised to inform the public of the historical origins of this resource for the purposes of attracting tourism on the island of Lemnos.

Observations

From the above discussion several issues can be noted of critical importance to the development of the islands in the past and today.

Resource Management. It has been observed that since the Byzantine period the extraction of the "Lemnian earth" was done exclusively once a year. Perhaps this practice was based on conservation purposes, associated with a Christian celebration. In effect, the Turkish conquerors appreciated the need to conserve this resource. In addition, the restricted availability of the earth in the market contributed to the maintenance of its high sale-price. The legal regime that governed the marketing and sale of the product were in accordance with its "high-value" quality, as discussed above.

Product's labelling. The seal of the goat in ancient times, later replaced by Diana's seal, was a mark associating the earth with worship rituals. Later, however, this seal served a different purpose. Specifically, it served to control the quality of the "Lemnian earth" available in the market. Furthermore, it helped the consumer distinguish the earth, from similar products of inferior quality available on the market. These alternative uses of the seal, resulted obviously in significant profits for the Ottomans. One could easily argue that the seal had become a symbol of quality and genuineness governing its sale under monopolistic regulations.

Further development. For thousands of years the "Lemnian earth" has been a marketable and highly lucrative commodity given its therapeutic qualities.

"We should not fail to follow Nature: the sovereign precept is to conform to it..."
Montaigne

They call it self medication - homeopathy, acupuncture, traditional herbalism and many others who seek ancient ways to keep us fit and healthy - are wrongly considered to be remnants of old superstitions. Today, hard science, social security and the many other items provided by modern medical technology have practically taken over our health.

There should not be, however, contradiction between hard and soft medicine - they are different yet complementary methods, the first based on modern scientific thought and the second on the experience of many people who acknowledge its benefits.

The use of clay, earth and mud is one of the most ancient healing methods, presently being given the greatest attention. May, like the ancient Romans, search for relief from arthritis pain through mud applications in a thermal spa. Many skin diseases are cured by clay or mineral waters. Many seek to rejuvenate themselves with Thalasso therapies on the ocean shore. We do not know fully how clay or mud work - but they work!

Overcoming Insularity Limitations

An important theme explored during the workshop related to the usefulness of telematics for the islands - those born on islands as well as those who have been moved to live there. The main argument was that teleinformatics are useful to help islands overcome the limitations of insularity and benefit from modern communication tools which are common with the continental urban citizen.

References

Stefanidou-Tzortzoglou B., Geographical and Travel Passages regarding the Island of Lemnos, Aristotelis (150-20th century) University of Salonic, 1886 (in Greek).

Peripherality and Centrality

Although the Aeolian archipelago appears to be peripheral to continental Europe, the history of the archipelago shows its centrality at the cross-roads of the Mediterranean. The sea did not isolate these islands; on the contrary, the sea acted as an impetus to trade of goods and ideas with different countries and cultures.

The sea and ebbs - a sort of dark volcanic rock highly valued in the late Neolithic and early Bronze Age for tool manufacturing - represented the strength of the islands in prehistoric times. Later, other traded commodities contributed to the wealth of Aeolian archipelago: sulphur and alum from its volcanic heritage and wine. As common to islands in this region, piracy also made an important contribution to the archipelago's economy.

Telematics and Tourism

Tourism, however, offered an unbalanced seasonal activity, and a type of economic development with undesirable impacts. A different tourism is presently needed using the rich natural and cultural heritage of the archipelago as the main attraction. The problem is this regard relates to the...

The Aeolian Islands on the Waves of Telematics

Michele Giacomantonio

In June 1996 an international workshop called "The Islands on the Telematic Wave" took place in Lipari, the capital city of one of the seven island archipelagos located north-east of Sicily in the Tirrenian Sea. Lipari is currently participating in the EU-funded Tele-Insula Project: Telematic Services for Islands.

Bronze Age for tool manufacturing - represented the strength of the islands in prehistoric times. Later, other traded commodities contributed to the wealth of the Aeolian archipelago: sulphur and alum from its volcanic heritage and wine. As common to islands in this region, piracy also made an important contribution to the archipelago's economy.

Overcoming Insularity Limitations

An important theme explored during the workshop related to the usefulness of telematics for the islands - those born on islands as well as those who have been moved to live there. The main argument was that telematics are useful to help islands overcome the limitations of insularity and benefit from modern communication tools which are common with the continental urban citizen.

Peripherality and Centrality

Although the Aeolian archipelago appears to be peripheral to continental Europe, the history of the archipelago shows its centrality at the cross-roads of the Mediterranean. The sea did not isolate these islands; on the contrary, the sea acted as an impetus to trade of goods and ideas with different countries and cultures.

The sea and ebbs - a sort of dark volcanic rock highly valued in the late Neolithic and early Bronze Age for tool manufacturing - represented the strength of the islands in prehistoric times. Later, other traded commodities contributed to the wealth of the Aeolian archipelago: sulphur and alum from its volcanic heritage and wine. As common to islands in this region, piracy also made an important contribution to the archipelago's economy.

Telematics and Tourism

Tourism, however, offered an unbalanced seasonal activity, and a type of economic development with undesirable impacts. A different tourism is presently needed using the rich natural and cultural heritage of the archipelago as the main attraction. The problem is this regard relates to

After World War II, and the rise of aviation travel, the islands assumed a different image in people's minds due to several successful films made on that location and the increase in tourism.

Telematics and Tourism

Tourism, however, offered an unbalanced seasonal activity, and a type of economic development with undesirable impacts. A different tourism is presently needed using the rich natural and cultural heritage of the archipelago as the main attraction. The problem is this regard relates to

The Aeolian Islands on the Waves of Telematics

Michele Giacomantonio

I
what is the best way to inform the outside world about this heritage?

The answer lies in tourism-related telematics and the Internet. And here lies the importance of the Lipari workshop. Tourism, supported by modern technologies, would promote and foster traditional crafts. In this way the host islanders can share their ancient traditions, utilising modern means of communication.

Electronic Tourism
In the ancient Mediterranean, sailors found it almost impossible not to encounter these islands — situated as they are in the middle of the Mediterranean. With telematics, the Aeolian islands can take centre stage again. They can be visited not only in the real world, but in the virtual world of Internet — electronic sailing, so to speak. It will be thanks to this possibility that many people will decide to visit the Aeolian Islands, to know them, and to share the experiences of those who live there.

Telematics and Education
Telematics can also permit improvements in the quality of life of the islanders and increase their access to opportunities offered by modern society such as education, information, democratic participation, and health care.

A school child of Alicudi should not be disadvantaged, as often happens due to second-rate education in the island, where teachers change very frequently, and are often unable to reach the island due to rough weather and seas.

Telematics would be very useful in this regard. It would enhance educational facilities in the islands. It would provide opportunities for the use of data bases and documentation — normally only accessible in the libraries of bigger towns. It could promote exchanges with other children and students and permits cultural growth through the knowledge of other people's experiences.

Telematics can also spare an old man living in Ginostra, in need of frequent medical check-ups, from making the tiring journey to the nearest health clinic.

Telematics and Business
On the Aeolian islands, transportation is greatly curtailed during the winter: the hydrofoil and ferry schedules are sporadic due to high seas and low demand.

In addition, one could investigate a number of additional possibilities through the use of telematics. How can telematics help young people willing to learn a craft or a profession and having neither the possibility nor the will to move away from islands? And how can telematics help small island firms to secure supplies of materials from outside the islands, and to advertise their products outside the islands?

Until very recently time, personal and business communication with the outside world was difficult and expensive, limiting the development options of the islanders. People either put aside their ambitions and hopes or had to emigrate from the islands.

Enhancing the Attraction of the Aeolian Islands
The combination of telematics and a new model of sustainable development can form the basis for a new life in the Aeolian Islands and thus contribute to making these islands attractive to live in and to visit.

The reader can visit the Lipari Municipality through the website: http://www.trainet.it/teleinsula

A Remarkable Environmental Event by Children from the Island of Lipari

P. G. d'Ayala

Last summer, the pupils of "Galileo Galilei" college, in Lipari, (an island North-East of Sicily) organized a regatta with boats built of recycled Coca-Cola cans.

This was a remarkable environmental festival. The participants in the race were the youngest children of the college, led by their imaginative teacher Mr. Enzo Di Donato.

Teams of girls and boys confronted each other in an original competition sponsored by local authorities together with Coca-Cola – an unusual race, with curious boats built of thousands of empty Coca-Cola cans picked up week after week from roads and beaches and collected and shaped later in the school-yard.

The day of the regatta was sunny and fair, rendering the event extremely enjoyable. Among the spectators were children from
neighbouring small islands and from Sicily, who together with their parents and tourists applauded and encouraged their favourite teams.

The successful boat race showed clearly the extent to which youngsters can be sensitized through education to understand environmental problems. The regatta was in fact the conclusion of a longer programme of work, involving creative work by the kids during extra-school hours.

Teaching and discussions facilitated greatly their understanding of the need to care for their island habitat. In other words, the pupils and their teachers offered an example to be followed by all, young and old.

On that regatta day, many people from the archipelago have understood how important it is to use one’s imagination to solve environmental problems.

A child finds an old her-ring can stranded on the beach by the heavy waves of the previous night. With two stones he shapes the rusted can into something resembling a ship with prow and stern. He ties a line to the prow, with the other end, to the stick in his hands and starts to float the model ship along the beach, dreaming...

A new beautiful object was born from almost nothing... from waste.

Since the beginning of mankind, children and artists have been tempted by the Prometean play of turning the world’s undifferentiated matter into something unique, oblivious of the previous properties – thus a diamond with concentric rays of light is created from the earth.

It is perhaps during the industrial revolution last century that humans started to burden their surroundings with waste that was unabsorbable naturally. But it is also during that century that the peculiar people we call artists attempted seriously to transform the refused object, the leftover, the meaningless waste in a polysémie expression of beauty.

In 1912, Braque and Picasso made a first breakthrough, using fragments of wire, newspaper, canvas or sand in their compositions.

Since then, the history of the plastic arts became an uninterrupted flow of experiments aiming to give meaning to meaningless itself.

One could of course ask: “What happens to art that tries to emancipate itself from the material limits of the object, when it is confronted with the miracle of the appropriating act, multiplying the ready-made objects?”
This question made by Catherine Millet found an answer, retrospectively, in 1962 in New York, when Arman mounted at the Dwan Gallery a “Spontaneous accumulation”, asking the visitors to throw their rubbish in a Plexiglas box made available for this purpose “Cast your vote here for a cleaner Dwan Gallery!”

Our industrial cities have been, and will be, the stimulus for avant-garde artists, attentive to transform the signs produced and consumed by our civilisation in symbols of hope. This was the case with the French sculptor Cesar, who turned crushed and compressed car-scrap into objects of surprisingly beauty (see photo on previous page).

But on an island where practically every item of consumption is imported what is the task of an artist? Andria Santarelli, Corsican painter, explores her island world with a permanently renewed curiosity translating its paradoxes into a meaningful object made of ordered combinations of abandoned items, such as imported Coca-Cola cans that a carelessly youngster threw away after having absorbed the magic potion of modern time.

She calls her compositions “Recycl’ar”. She says that collecting “incassable” – crushed cans (the Corsican word is very expressive) could be considered she says, at going back to the primitive instinct of fruit-picking, but these cans are also the witness of something which was alive. Artists have always been fascinated by wrecks and ruins because of their inherent appealing quality – standing as the symbols of the downfall of everything.

These cans bear witness to the phenomenon of chance where the repetition of the same gesture never produces the same result. Their varying shapes are evident when they are juxtaposed. Hence juxtaposition, in its symmetry, gives a coherent notion of what chance may do.

Andria’s art relates to man’s attempts to keep a balance between his natural universe and a world becoming increasingly artificial.

In Minorca one finds many quarries – large holes cut into the earth – from where all the stone for the construction of old towns of the island were cut. Weeds, bushes, wild almond and olive trees and rubbish have over time, concealed these huge gaps in the earth.

These quarries provide an important explanation regarding the construction of building in old Minorca. The basic materials of many buildings, ranging from the most humble abode to the cathedral itself and the palaces, have originated from the depths of these sandstone quarries. Thousands and thousands of blocks were extracted from the rock-face, one by one – slowly but surely creating the monumental crypt-like subterranean spaces.

Poetry in Stone

It is through the use of stone that the Minorcans expressed their poetic sensitivity towards life. The metaphor of little rock. The attachment that the Minorcans have for their stone is legendary.

When early last century many Minorcans left their island attracted to the new attracting French possessions in Algeria, they loaded their vessels with Minorcan quarry-stones, which they used to build their houses in their new North-African home.

Lithica is a non-profit NGO, based in Minorca, and chaired by Leotitia Sauleau Lara, artist and sculptor.
Lithica

As times became economically harder, many "unemployed" persons found a way out of their absolute misery by working in the quarries or opening a piece of land to be quarried, in exchange for which they paid 10% of the profits to the land owner – sometimes in the form of quarried stone. These first quarrymen hewed and lifted the blocks of stone by the strength of their arms.

Frequent changes in the location for stone-extraction is the reason why there are innumerable little quarries close to the towns. Many houses were started with a quarry as foundation – block after block were cut into a cellar and then the blocks were used to built the walls of the houses. The job as a quarryman was often "part time", a stepping stone to speak, until they found a better or more stable job.

Later, the invention of a mill-powered crane to lift the blocks made the conditions of work better and also increased demand. The deeper excavation which this invention made possible improved the quality of the stone, and made the cutting process easier. In turn, the whole process was rendered more profitable. The cutting and extraction of blocks was a thing of the past. Thanks to the new mechanised system life was made easier for the quarry worker, with more comfortable methods of production and more spacious workplace.

The beginning of mechanisation also marked the beginning of a modern business-like structure with the keeping of proper accounts, and the introduction of modern management concepts. Today however, business in stone quarrying is somewhat precarious, with rising costs and intense competition. Revenues tend to be irregular and depend to a large extent on the quality of the stone.

A Sculptural Space

The Minorean quarries may be considered as sculptures – inverted ones you might say since these "empty spaces" are build downwards, sometimes taking a monumental character.

But even the smaller quarries have magical and mystical qualities. They constitute a space with its own story, its birth, childhood, old age and death. Each one has its very individualistic personality – like human beings they are the result of hard times and good times. Some are more open, some more closed, some shy and unapproachable others warm and welcoming. All, however, talk the same language – old stairways, wounded and reddened by the sun, moisture and wind, especially the north-east winds "Tramuntana".

The quarries are the heritage of the Minorean people and they must be preserved. This heritage not only reminds us of how the Minorcan were, but also of how they are now – how they lived and how they live now! That is why the preservation of the quarries has played an important part in Minorea being declared by UNESCO a Biosphere Reserve.

Restoration

Sensitivity to the protection of the quarries is a relatively recent development. In 1986 the Ciudadelas town hall categorized nine of these quarries as being of great interest in terms of artistic and historic heritage. In addition, at that time government commissioned a report to catalogue all the quarries in the island.

Lithica and the Quarries

Lithica is an association with came into being as a result of a desire to save the quarries of Minorea, mostly for their aesthetic qualities, especially with regard to the "naked wall", as a special way of perceiving the space which has been worked upon.

Lithica is growing thanks to the highly esteemed tradition of artisans. Lithica manages to rent the coastal quarries, situated two kilometres outside Ciutadella.

The good thing about this site is that within a minute's walk one can connect with the old with the new or the new with the old, whichever direction you choose to take. Both aspects exist side by side and are beautifully preserved. A classical example of the old style contrasts with the dynamic new, only a stone's throw away.

One of the first real achievements of Lithica was to completely clear out one of the larger modern quarries of its rubbish. The end result was devastating. In the cleaned-up quarry one finds the "Totem" (see picture) representing the association in symbolic form. This symbol is intended to join and separate the old with the new at the same time.

The Labyrinth

The older quarries constitute an exceptional sculptural park, from the red seams, and unexpected shapes resembling prows of sailing ships, the amphitheatre, fan-shaped objects and frames. These quarries serve, in addition, as quiet, agreeable and protected gardens. On this humid land, where the air is in permanent repose, the most characteristic and specific plants and trees of Minorea have been cultivated, rendering the quarries of St Hostal of Lithica an excellent place for a stroll.

Ecological Equilibrium

To carry out some of the objectives of the association, Lithica has managed to rent the coastal quarries, situated two kilometres outside Ciutadella.

The good thing about this site is that within a minute's walk one can connect with the old with the new or the new with the old, whichever direction you choose to take. Both aspects exist side by side and are beautifully preserved. A classical example of the old style contrasts with the dynamic new, only a stone's throw away.

One of the first real achievements of Lithica was to completely clear out one of the larger modern quarries of its rubbish. The end result was devastating. In the cleaned-up quarry one finds the "Totem" (see picture) representing the association in symbolic form. This symbol is intended to join and separate the old with the new at the same time.

Culture and Traditional Knowledge

Lithica is not only about the quarry as a space and a work of art. It is also dedicating its efforts to the memory of those who opened these spaces in the earth – the quarrymen. It has undertaken a project involving the setting up of an open-air ethnographic museum which explains the techniques, the tools and the working conditions of the artisans. A section for research into sand stone is also being envisaged. This could promote new ways of using the stone in building, restoring it. There could also be a "hands on" area for people interested in the restoration of historical Minorcan buildings.

Lithica's Programme

Lithica has developed a programme of events centred around the quarries, with the aim of promoting their recovery. This project which resemble or could be transformed into the amphitheatres of ancient Greece or the labyrinth of ancient Crete.
Lithica

requires the support of the local authorities, since it is in line with their social and cultural interests.

The association has made the necessary arrangements for the most important quarries in terms of cultural interest; it has also taken measures to include the project within the legal proceedings in terms of the declaration of Minorca as a Biosphere Reserve. The Association has in addition obtained the backing of the Ciudadela town hall, which has already catalogued the "Hostal" quarries.

The Lithica programme has evolved in four phases:
   • Removal of rubbish and cleaning of the older quarries for conversion into parks/gardens.
   • Securing the zone against accidents and improving the paths and the care of existing plant and wildlife.
   • Planning for the setting up of a small museum of ethnography concerning the work of a quarryman.
   • Contacts with other European quarries converted into cultural spaces such as "La Cathedrale d'Images" from les Baux de Provence (France) with the aim of exchanging experiences.

   • Creation of an amphitheatre with blocks of stone taken from the quarry.
   • Development of an organized educational walk, with interpretation of the history of the quarries.

   • Lithica park cleared and cleaned – creating a zone of cultural activities based on a sandstone quarry space.
   • The creation of substitutes which are appropriate for a cultural's diverse habitat and necessary services.

   • The organization of cultural spaces dedicated to creative arts within the realms of sandstone.
   • Workshops for young sculptors, and an international experimental station addressing the technical and scientific aspect of sandstone use.

Conclusion

In a modest way the Association would like Minorca to form part of the mystical circle taking its origin in Petra (Siria), driving through the Cappadocian stone settlements in Anatolia (Turkey), shifting to the megaliths of Easter Island in the Pacific, wandering back to Malta in the Mediterranean, in the process passing through and touching the stone heritage of many islands.

Lithica proposes finally a different way to experience these stony spaces; one of perception, peace and reflection. In these times of noise we propose inner silence; in the face of deprecation – the eternal; instead of the superficial – the profound.

Images from les Baux de Provence (France) with the aim of exchanging experiences.

The stone totem (Photo L. Toussaint)

Proposal for landscaping the quarries of Minorca (Photo Lithica)

Lithica

Status of NGO for INSULA

The Director General of UNESCO, following consultations with the executive council of INSULA, has, in July 1996, awarded to INSULA the important status of International non-governmental organization, enjoying operational relations with UNESCO.

Santorini and Stromstrad Meetings

An important international experts meeting on Policies for Sustainable Development of Mediterranean Coastal Areas took place at the end of April 1996 in Santorini (Greece). The meeting, under the auspices of UNEP and its Mediterranean Action Plan, was chaired by the present Greek Minister for the Aegean, Mrs Elizabeth Papazoi. INSULA was asked to represent the interests of the Mediterranean islands.

In Mid-August 1996, INSULA contributed to the organization of the workshop on "Northern Shores and Islands: Human Well-being and Environmental Change" held in Stromstrad, Sweden.

More than one hundred participants gathered in this coastal town, close to the Koster islands in Northwest Sweden. The conference was convened by Prof. Guy Heyden from Gothenburg University and Bengt Gilbert of the Koster Health Foundation.

These meetings and a previous one held in Fuerte Ventura (Canary Islands) offered the opportunity for INSULA members to discuss the content of the "Minorca Commitments", with the aim of building a consensus on this document before its formal approval at the Minorca Conference on April 1997.

E.U. Projects

Together with the European Commission, INSULA looks forward to the implementation of Tele-Insula, the project dealing with telematics applications to European Union island services. Three more E.U. projects involving INSULA have been approved recently:
• the renewable energy plan for the island of Minorca;
• the study of "Human Use of Mediterranean Coastal Wetlands";
• the project initiated by the Municipality of Ajaccio (Corsica), aiming to organize a co-operative network among Mediterranean island municipalities (Eco-Villes) in waste management and in other areas.

Cultural Heritage

An agreement relating to cultural heritage has recently been signed by the chairman of the Italian section of INSULA, Architect Luigi Valente and H. E. Mons. Angelo Rizzo, Bishop of the historical city of Ragusa (Sicily). The agreement contains a protocol of co-operation aiming at the promotion, the protection, and conservation of the considerable architectural, artistic and historical-archival heritage of the church of Ragusa.

INSULA is also collaborating with the Islands and Small States Institute of the University of Malta in the organisation of an international conference on "The Cultural Heritage of Islands and Small States". This conference will bring together a large number of scholars and practitioners concerned with the preservation of the artistic and archaeological heritage of small islands. One important item on the agenda relates to access to information on the cultural heritage of islands through electronic communication technology. Another item relates to the prospects for cultural tourism in islands.

Internet Connection

Insula is electronically connected with its partners. INSULA's address is: insula@speedy.grolier.fr.
INSULA's site on WWW can be reached at: http://www.trainet.it/teleinsula.

Status of NGO for INSULA

The Director General of UNESCO, following consultations with the executive council of INSULA has, in July 1996, awarded to INSULA the important status of International non-governmental organisation, enjoying operational relations with UNESCO.

Santorini and Stromstrad Meetings

An important international experts meeting on Policies for Sustainable Development of Mediterranean Coastal Areas took place at the end of April 1996 in Santorini (Greece). The meeting, under the auspices of UNEP and its Mediterranean Action Plan, was chaired by the present Greek Minister for the Aegean, Mrs Elizabeth Papazoi. INSULA was asked to represent the interests of the Mediterranean islands.

In Mid-August 1996, INSULA contributed to the organisation of the workshop on "Northern Shores and Islands: Human Well-being and Environmental Change" held in Stromstrad, Sweden.

More than one hundred participants gathered in this coastal town, close to the Koster islands in Northwest Sweden. The conference was convened by Prof. Guy Heyden from Gothenburg University and Bengt Gilbert of the Koster Health Foundation.

These meetings and a previous one held in Fuerte Ventura (Canary Islands) offered the opportunity for INSULA members to discuss the content of the "Minorca Commitments", with the aim of building a consensus on this document before its formal approval at the Minorca Conference on April 1997.

E.U. Projects

Together with the European Commission, INSULA looks forward to the implementation of Tele-Insula, the project dealing with telematics applications to European Union island services. Three more E.U. projects involving INSULA have been approved recently:
• the renewable energy plan for the island of Minorca;
• the study of "Human Use of Mediterranean Coastal Wetlands";
• the project initiated by the Municipality of Ajaccio (Corsica), aiming to organise a co-operative network among Mediterranean island municipalities (Eco-Villes) in waste management and in other areas.

Cultural Heritage

An agreement relating to cultural heritage has recently been signed by the chairman of the Italian section of INSULA, Architect Luigi Valente and H. E. Mons. Angelo Rizzo, Bishop of the historical city of Ragusa (Sicily). The agreement contains a protocol of co-operation aiming at the promotion, the protection, and conservation of the considerable architectural, artistic and historical-archival heritage of the church of Ragusa.

INSULA is also collaborating with the Islands and Small States Institute of the University of Malta in the organisation of an international conference on "The Cultural Heritage of Islands and Small States". This conference will bring together a large number of scholars and practitioners concerned with the preservation of the artistic and archaeological heritage of small islands. One important item on the agenda relates to access to information on the cultural heritage of islands through electronic communication technology. Another item relates to the prospects for cultural tourism in islands.

Internet Connection

Insula is electronically connected with its partners. INSULA's address is: insula@speedy.grolier.fr.
INSULA's site on WWW can be reached at: http://www.trainet.it/teleinsula.
Telematics and Environmental Sciences

The recently established Coastal Zones and Small Islands Unit, headed by Dr. Dirk Troost at UNESCO’s sciences sector, has successfully entered in an important joint-venture with other European partners which, no doubt, will be of interest to scholars and practitioners involved in island studies and island development.

The project, named CASTLE for short, is supported by the European Commission, and aims at developing a user-friendly and cost-effective interactive distance learning system by applying modern telematic technologies, methods and services.

The first applications and demonstrations envisaged by CASTLE will deal with the training of specialists and students in various disciplines in the use of satellite remote sensing data — an area of major interest for island and coastal zone planners and decision makers. To train such people in the usual classroom environment, located on a specific site is both costly and time consuming. The CASTLE project will provide an interactive on-line distance learning environment, making more effective use of time for the users, providing better access to information and removing heavy financial and spacial barriers. This approach will also improve communication among instructors and trainees and among trainees themselves.

Via electronic network, courses can be made available at the home-base of interested people, preserving simultaneously the benefits of interactive group training in a virtual classroom.

The system proposed by CASTLE will be tested with a selected number of European teaching institutions electronically interconnected. INSULA suggests that UNESCO and its partners locate at least one testing site within an island university.

For further information contact Dr. Dirk Troost, Coastal zones and small islands Unit, UNESCO, 1, rue Miollis, 75015 PARIS. Phone: (33) 1.45.68.39.71; Fax: (33) 1.45.68.55.08; e-mail: dtroost@unesco.org.

Islands and Biosphere Reserves

The intergovernmental Man and the Biosphere Programme (MAB) is opening new perspectives for islands considering the biosphere reserve concept as an appropriate tool to foster sustainable development.

Together with INSULA and the Canary Islands and Spanish authorities, MAB is organising an international gathering for island biosphere reserves managers, at the end of February 1997 in La Palma (Canary Islands, Spain).

The aims of the meeting are:
- to harvest the experience gathered in terms of implementation and management in areas such as protected areas, biodiversity, energy, transport, tourism, waste and coastal zones management including the introduction of new information technologies for an enhanced scientific and technical cooperation;
- to introduce and support the principles of a political and technical cooperation agreement among local authorities and island reserves managers, to be implemented with the assistance from international organizations;
- to discuss the draft text of commitments to be approved by the 1st European Conference on sustainable island Development (Minorca, April 1997) and contribute to it with the specific model stemming from biosphere reserve experience;
- to diffuse permanently the results of cooperation and propose pilot projects and actions;

Three main actions are envisaged consequently:
- to present the meeting’s achievements at the Minorca Conference;
- to implement the cooperation programme;
- to diffuse the results via Internet through a WWW site dedicated to island information.

For further information contact Mr. Cipriano Marín Cabrera - INSULA. Phone: (34) 22.20.09.51; Fax: (34) 22.20.09.51; e-mail: mab@unesco.org.

Book Reviews

Island Technology: Technology for Development in the South Pacific

Editor by Tony Marjoram

Intermediate Technology Publications Ltd


Small developing island states and small islands in general, face difficult choices when confronted with the often contradictory issues brought forward by unescapable development needs, particularly when sustainability is at stake.

The choice of technologies adopted to their context is a major area of uncertainty involving not only financial but also human resources availability a context to which little attention has been directed especially in the South Pacific.

The volume edited by Tony Marjoram tries to fill this gap bringing together the best available experience concerning the problems of technology and development in South Pacific islands, while engaging a reflection on future perspectives including the hope that indigenous and traditional know-how will successfully be combined with modern technology and generate innovation.

More modestly, for the time being, the author selected a dress practical but vital issues - topics are discussed from different perspectives - contributors include engineers, scientists, economists, sociologists, plans and policy specialists who work in education, development, planning, banking, management and technical research, etc.

Contributions vary in depth and breath, perception and perspective, offering each the appropriate matter for reference and consultation to people working development and technology in the South Pacific, looking for a better integration of policy and planning with community development, linking grassroots with the tree-tops.

Several people and organizations contributed to the publishing of the book, including UNESCO and its regional office for South Pacific and the Australian National Commission for UNESCO.

Those who are concerned with the development problems of the Pacific islands and the unanticipated effects stemming from western technology transfer to developing countries may usefully learn from the fairly unique approach used in the book.

Technology development after all concerns all of us, islanders from developing and the developed worlds.

Regolazione sociale, insularità, percorsi di sviluppo

Alberto Merler and Maria Lucia Figa

EDES: Sassari, 1996.

ISBN 88-80002-00-9

In recent years interest in island matters has grown rapidly. In academic circles, many institutions dealing with island studies have been established in different parts of the world.

The book is written in Italian and authored by two scholars based at the Istituto di Studi comparativi sull’Insularità, of the University of Sassari in Sardinia.

The book proposes three elements of reflection: 1. Insularity. The way the concept is developed and used in this book refers to a concrete position related to the physical and socio-cultural situations. Such positions do not simply imply isolation but refer to a capacity and a potential to build fields of communication with the outside world.
Tourisme et environnement en Méditerranée: enjeux et prospective.

Author: Robert Lanquart et al


This new fascicle prepared collectively under the aegis of the Mediterranean Blue Plan covers a subject of utmost importance for a region which receives about one third of the total number of international tourists. The direct and indirect economic dimension of this activity, including up to date figures for tourist supply and demand, is analysed in detail for all Mediterranean coastal States.

The physical and human characteristics of tourism of the region, resulting from both history and geography are described. The special features of Mediterranean tourism are pointed out and the interactions between touristic activities and the environment in these coastal regions are presented in detail.

The organisation, policy and legislation for tourism in the different countries of the region is described, showing the diversity of situations encountered. The need for harmonization of these policies and legislation in a region where all countries are losing from the competition with each other is stressed. As the case of all Blue Plan fascicules, the present work offers a prospective study on how tourism might develop in the region until 2020.

This study shows that in the case of a sustainable development scenario paying special attention to the environment, the number of tourists will be substantially higher if current development trends were followed. This somewhat paradoxical conclusion is partly explained by the growth of national tourism in the first scenario. Figures are provided for possible numbers of tourists in the coastal areas and islands, as well as for land, water and waste disposal requirements.

The volume concludes on a number of recommendations for action by the various actors concerned, including a call for developing a regional co-operation network. Such a publication should be of interest to decision makers, planners, tour operators and all those concerned with tourism professions, as well as to geographers, research workers and those who care about the protection of the Mediterranean region.

Sustainable Tourism in Islands and Small States: Issues and Policies

Edited by Lino Briguglio, Brian Archer, Jafar Jafari, and Geoffrey Wall.

Cassell-Pinter, London / New York, 1996.


The book contains in the book, in general, admit that tourism is attractive in terms of income and employment, especially for those islands which have a comparative advantage in tourism services due to their attractive climate, the sea and the sun.

Written by authors from a variety of disciplines, the individual chapters of the dealt with, amongst other topics, the economic perspective, alternative forms of tourism, the problematic nature of defining sustainable tourism, size constraints in island tourism, the question of monitoring and control, and the implications of climate change.

The work therefore provides a handy and up-to-date volume of general studies on island tourism. A companion volume, Sustainable Tourism in Islands and Small States: Case Studies, contains surveys of a more specific nature.

The book looks at sustainable tourism from a number of viewpoints, including the economic, the anthropological, the sociological and the ecological. It is a well-balanced publication, in that sustainability is not approached from the perspective of just one discipline.

The book contains a very good author and subject index, and the papers contain a fairly large list of references. These should prove very useful to the researcher on the theme of the book, since in one volume, the reader can link the theme of the papers with a large number of publications, covering a wide spectrum of themes related to island matters and to tourism.
Letters to the Editor

Integrating Economic and Environmental Planning

Dear Editor,

I wish to bring to the notice of your readers the final statement approved by the participants at the International Conference on Integrating Economic and Environmental Planning in Islands and Small States, held at the Foundation for International Studies, Valletta, Malta, between 14 and 16 March 1996:

1. Note that Islands and Small States have a commonality of interests with other larger states and territories, but at the same time tend to have specific characteristics, notably those associated with the interdependence of small size, economic vulnerability and ecological fragility, and call upon policy makers at local, national and international levels to acknowledge these specific characteristics in sustainable development policies and programmes.

2. Stress the need for integrating economic, environmental and socio-cultural concerns in planning at the local, national and international levels to achieve the goals of sustainable development.

The participants at the International Conference on Integrating Economic and Environmental Planning in Islands and Small States, held at the Foundation for International Studies, Valletta, Malta, between 14 and 16 March 1996:

- to formulate principles and to provide the necessary mechanisms at the political level to facilitate and guide action towards the attainment of sustainable development;
- to do their best to raise awareness of the impacts of all development activities on the natural and sociocultural environment and to use all available media of communications to promote such awareness;
- to develop the necessary institutional capacity and mechanisms to implement monitor and enforce, as efficiently and effectively as possible, the planning policies and the associated rules and regulations;
- to invest as necessary in the development of human resources with the aim of carrying out the desired planning objectives;
- to recognise the importance of, and encourage self-regulation and voluntary codes of conduct standards, where appropriate, and also develop public sector involvement to construct measurable standards of environmental protection and enhancement;
- to make a greater effort to use economic instruments as incentives for environmental protection and enhancement;
- to foster participation by the local population and local interest groups in the planning exercise and in the research agenda related to planning, with the aim of ensuring that the ultimate aim of planning remains the improvement of the quality of life of the people, while maintaining the integrity of the environment;
- to support appropriate research for the purpose of promoting planning for sustainable development.

5. Urge scholars, practitioners and authorities involved in planning to increase their effort to move towards a common and easily understood language in order to accommodate the different approaches and disciplines in economic, environmental, sociological and related areas of study.

6. Support the promotion of international networking among institutions, communities and individuals concerned with Islands and Small States' affairs with the objective of fostering research and training activities in matters of direct interest to Islands and Small States and strengthening the capacity of Islands and Small States to integrate economic and environmental aspects in planning.

7. Thank the Islands and Small States Institute of the Foundation for International Studies and the Planning Authority of Malta for organising the Conference and acknowledge with gratitude the support for the conference extended by the Maltese Ministry for the Environment and other organisations which have facilitated attendance at this conference.

Maryrose Vella
Administrator,
Islands and Small States Institute,
Malta.

A Letter from a Young Islander

Dear Dr. d’Ayala,

My name is Mark and I live on in Vanuatu – an island in the South Pacific that is not very well-known.

My father has been a member of Insula for over four years now.

I am an interested reader of Insula - the International Journal of Island Affairs. I first read the journal four years ago, when I was 12 years old. I am now 16, and due largely to the journal, I have become much more knowledgeable about small island states such as Vanuatu. Being an islander myself, I hope that a more people from all over the world will become aware of the importance of sustaining the culture and environment of islands.

I look forward for the next issue of the journal.

Should find yourself in the South Pacific, please visit Vanuatu – my family would love to show you our tropical paradise.

Mark Kelly
Port Vila, Vanuatu
INTERNATIONAL SYMPOSIUM ON CONSERVATION OF MONUMENTS IN THE MEDITERRANEAN BASIN

Rhodes: 6-11 May 1997

Organized by the NATIONAL TECHNICAL UNIVERSITY OF ATHENS INTERNATIONAL GROUP ON THE CONSERVATION OF MONUMENTS IN THE MEDITERRANEAN BASIN with the co-operation with and under the auspices of the relevant Hellenic institutions and authorities.

Further information can be obtained from:
Prof. Antonia Moropoulou Coordinator of the Scientific Committee, Office for Public and International Affairs 9, Iroon Politechniou, Zografou Campus, 157 73 Athens, Greece Tel. (30-1) 772 2017/2006; Fax (30-1) 772 2028

INTERNATIONAL WORKSHOP ON ISLAND AND BIOSPHERE RESERVES

INTERNATIONAL COOPERATION TOWARDS SUSTAINABLE ISLAND DEVELOPMENT

20 – 22 FEBRUARY 1997 ISLA DE LA PALMA, CANARY ISLANDS, SPAIN

The objectives of the workshop are the following:
• to encourage co-operation on management, planning and promotion of sustainable development in island biosphere reserves;
• to take advantage of the new thematic tools for inter-island co-operation;
• to share the relevant experiences in island biosphere reserve management;
• to promote a commitment towards technical and political co-operation, both at a national and international level, between local authorities and island managers, with the support of international organizations;
• to submit the decisions taken at International Workshop to the 1st European Conference on Island Sustainable Development, to be held in Minorca on 23/27 April 1997;
• to diffuse the results of co-operation and to put forward practical suggestions regarding the implementation of joint pilot projects and other specific actions.

Further information can be obtained from:
Cipriano Mirin Cabrera, INSULA (e-mail: py@teneri.step.es) or from MAB – UNESCO, (e-mail: mab@unesco.org); 1, rue Miollis, 75015, Paris France. Tel: (33 1) 45.68.4056; Fax: (33 1) 45.68.5804

Nature and Workmanship Artifical Wetlands: Threatened Coastal Areas in the Mediterranean

INTERNATIONAL MEETING PARIS: 19 - 20 June, 1997

Venue: UNESCO, 1 rue de Miollis, Paris

Subjects for discussion:
• The ecological and socio-economic importance of artificial wetlands in the Mediterranean. What are they and what do they offer? • Main conservation threats. Risks, abandonment, irreversibility • What are the main productive activities contributing to their maintenance? • Co-operation possibilities in the area of information • What role can ecotourism play in the sustainable management of these areas?

For further information, contact:
insula (International Scientific Council for Island Development) c/o UNESCO 1 rue de Miollis, Paris Tel: 33 1 45 68 40 56 Fax: 33 1 45 68 58 84; e-mail: insula@insula.org; web site: www.insula.org
International Conference
HUMAN RESOURCES AND FUTURE GENERATIONS
IN ISLANDS AND SMALL STATES
Valletta, Malta; 6 - 8 November 1997
organised by the Future Generations Programme and the
Islands and Small States Institute of the Foundation for Inter-
national Studies, University of Malta, in collaboration with the
Foundation for Human Resources Development, Malta.

Topics to be addressed by the conference include: • new economic development models respecting the
limits, responding to present and future human needs • human resources development • towards
alternative educational models: mobilizing and training the public to care for future generations.
All correspondence should be addressed to: The Secretary, International Conference on Human
Resources, Foundation for International Studies, University Building, St. Paul's Street, Valletta -
VLT 07, Malta. Tel: (356) 234.121/2, 248.218, 240.748; Fax: (356) 230.551; E-mail: ibrig@cis.um.edu.mt

UNIVERSITY OF MALTA
POST-GRADUATE COURSES
offered by the Islands and Small States Institute
at the Foundation for International Studies.

Post-Graduate Diploma
in Educational Planning and Management in Small States

Master of Arts in Islands and Small States Studies

For information about these and other post-graduate courses in islands and small states studies, please contact:
The Secretary, Islands and Small States Institute, Foundation for International Studies, University Building, St.
Paul Street, Valletta, VLT 07, Malta. Tel: (356) 248.218, 234121/2, Fax: (356) 230.551; e-mail ibrig@cis.um.edu.mt

International Conference
EDUCATION AND TRAINING
IN INTEGRATED COASTAL MANAGEMENT:
The MEDITERRANEAN PROSPECT
GENOA, MAY 25-29, 1998

Convened by the
International Centre for Coastal and Ocean Policy Studies (ICCOPS)
with the sponsorship and cooperation of:
Intergovernmental Oceanographic Organisation (IOC) of UNESCO
Coordinating Unit for the Mediterranean Action Plan (MAP) of UNEP
International Centre for Science and High Technology (ICS) of UNIDO

A Contribution to the 1998 United Nations International Year of the Ocean
An initiative supported by INSULA

The International Scientific Council for Island Development (INSULA) was formally created in
November 1989, on the occasion of the MAB island meeting in Bret. It is an international non-
governmental organization which aims to promote the sustainable development of small islands in all
regions of the world.

The Council’s objectives are:
• to encourage technical, scientific and cultural cooperation;
• to assist island communities in integrated planning;
• to contribute to the protection of island environments; and
• to promote the development of the islands’ resources, with a special interest in island cultures and human
resources development.

Three main lines of action have been proposed within INSULA:
1. Management of island resources. This includes attention to administrative procedures (including
organization and systems definition, operation and formation); natural resources (terrestrial, coastal and
marine, including identification, management, conservation and training); cultural resources (identification
of built and non-built cultural heritage and non-material cultural heritage such as tradition and music);
human resources (identification of potentials and needs, educational strategies and multisectoral
training).
2. Technical assistance. This is envisaged in such fields as fisheries, agriculture, forestry, tourism, transport
and communications, parks and natural reserves, appropriate technologies, renewable energy sources,
management and treatment of water and waste; management of coastal zones; perception and prevention
of natural and man-induced risks and mitigation of adverse effects on populations and the environment;
nutrition and health; social and economic development.
3. Strategies for sustainable development. This line of action covers definition and diffusion of principles and
models for integrated development of island environments; field studies and analyses for facilitating
procedures for optimal use of island resources, and evaluation of strategies promoting sustainable
development, applied to the special conditions of small individual islands or groups of adjacent islands.

The activity of INSULA will be essentially catalytic, designed to promote the application of multidisciplinary
scientific research and technology and innovations in education, culture and communications to the
specificities of small island situations.

The Council organizes seminars and conferences at national, regional and international levels and promotes
a direct dialogue with and between the authorities and the populations of different islands and island
groups. It also promotes cooperation and exchange of experience and expertise between islands of a given
region as well as at the inter-regional level, particularly through the network of specialists and projects of
the MAB Programme of UNESCO.

Through its international and multidisciplinary network of experts and researchers, INSULA contributes
towards balanced, sustainable development initiatives undertaken by island authorities. To this end,
INSULA will cooperate with national, regional and international organizations that are involved in
programmes of island development.

INSULA also publishes its own journal, insula, which specialises on island affairs. Every issue contains
regular features and a dossier on an important aspect of island development.

Join and Support INSULA
For individual and group membership in INSULA, see overleaf.
**Insula**, the International Journal of Island Affairs, is published by the International Scientific Council for Islands Development. The aim of the journal is to create a worldwide forum for all those who consider islands as an important part of mankind's heritage deserving major attention. Contributors can use the Journal to share news and views about the islands of the world from a variety of perspectives, including the following:

**Environment**
- Environmental management
- Natural resources conservation
- Water
- Liquid and solid waste management
- Prevention of natural hazards

**Sustainable development**
- General economics
- Tourism and transport
- Agriculture and aquaculture
- Fishing and ocean resources
- Bio-technologies
- Industry and mining
- Applied communication technologies
- Renewable energy
- International politics and policies

**Population**
- Demographic trends
- Health
- Human geography, human resources,
- Education and training
- Culture
- Traditional knowledge

The journal will publish articles and communications that provide new insights and understanding about the subjects mentioned above and invites authors to submit their studies and comments. Guidelines of style can be obtained from the editorial office at the address appearing below.

**Insula – the International Journal of Island Affairs**

**Application for Membership of INSULA**

I wish to become member of INSULA, the International Scientific Council for Island Development

Surname: ____________________________ First Name: ____________________________

Institution: __________________________

Address: ____________________________

City: ____________________________ Country: ____________________________

Telephone: ____________________________ Fax: ____________________________ e-mail: ____________________________

Annual membership:

- Individual □ 400 French Francs
- Institution □ 1200 French Francs
- Supporting members □ 2000 French Francs (or more)

I am paying the amount of ____________________________

by:

- Cheque □
- Master Card □ Visa □ American Express □

Cheques are to be made in French Francs payable to "INSULA".

Credit card number: ____________________________

Expire date of credit card: ____________________________

Signature: ____________________________ Date: ____________________________

**Insula**, c/o MAB - UNESCO: 1, rue Miollis, 75732 Paris cedex 15, France

Tel: (33 1) 45 68 40 56, Fax: (33 1) 40 68 58 04; email: insula@speedy.grolion.fr

**TELE-INSULA**

HELPING ISLANDS MITIGATE THE CONSTRAINTS ARISING FROM INSULARITY.

The project, supported by the European Union, is based on the provision of telematic services applications to a selected group of European islands, from the North-Sea and the Baltic to the Eastern Atlantic islands, from the central Mediterranean to the Greek archipelagos. The project is also being extended to Far Away Ulithi, INSULA's atoll-friend, situated in Micronesia in the South Pacific.

A selected group of European partners coordinated by INSULA are also engaged in the challenging endeavours to provide and test, together with the islanders, a set of much needed services based on telematics with the aim of complementing the efforts of these small communities to overcome their 'insular' constraints. Distance learning and training, tele-medicine, easy access to public services, improvements of tourism services, access via an electronic media to a worldwide information system, and exchange of experiences and information between islands are among the objectives pursued by the TELE-INSULA Project.

No doubt the experience and know-how contributed by the partners will provide the project with a synergistic effect, capable in itself to generate unexpected innovations.

Local authorities have also joined the partnership. These include the Municipalities of the islands of the French region of Finistère, the town-hall of Lipari in the Eolian Archipelago northeast of Sicily and the Highland Authority in Scotland, U.K. Other partners are service providers, including TRAINET, belonging to the powerful Italian STET-TELECOM group, POOL-STRATEGIE cooperating with France TELECOM and the regional authorities, the SAMOS HEALTH INSTITUTE together with the University of the Aegean, CITMA in the well-known Portuguese island resort of MADEIRA and finally AETHRA in Italy, which will contribute the hardware and the software application.

http://www.trainet.it/teleinsula/
Published by
INSULA – the International Scientific Council for Island Development
with the support of UNESCO
in collaboration with the
Islands and Small States Institute
of the Foundation for International Studies, Malta.

Produced by Formatek Ltd, Malta