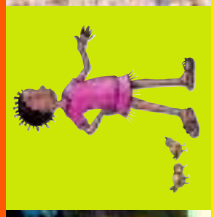
Education Kit on desertification

Case studies



Combating desertification bears fruit

Case studies

Case studies compiled within the spirit of the **United Nations Convention to Combat Desertification**

Combating desertification bears fruit

What makes the desert beautiful is that somewhere hides a well...

– Antoine de Saint-Exupéry

The case studies in this compilation are designed to provide concrete examples of successful projects undertaken within the spirit of the United Nations Convention to Combat Desertification (UNCCD).

All statistics mentioned in this document are provided by the *United Nations World Statistics Pocketbook* (United Nations publications, 1999)

How to use the case studies series

The case studies are addressed to teachers at the end of primary school education

and make up part of the pedagogical kit on desertification devised by UNESCO and the UNCCD. They were submitted by the UNCCD national focal points and by non-governmental organisations, (NGOs) working in the field of combating desertification in response to a joint letter sent from UNESCO and UNCCD inviting them to submit examples of projects to combat desertification. Two case studies were retained from UNEP (United Nations Environment Programme) within the framework of the 'Saving the Drylands' award. Choosing the case studies from the numerous replies received was no easy task, but the final selection attempts to provide a global vision of the root causes and consequences of drought and desertification in the different regions of the world. We would like to thank all the UNCCD national focal points and the NGOs who have participated, and in particular those involved with the case studies that were not included for reasons of a structural nature.

Attentive reading of the case studies should provide the teacher with the knowledge base necessary to help combat desertification.

In the classroom, he/she will be able to enhance his course on desertification with positive examples intended to persuade children to adopt a healthy attitude towards their environment and the scarce natural resources present in their region. The global approach of this compilation, introducing the causes and consequences of desertification as well as solutions in the continents affected, aims to raise awareness among children affected by universal environmental problems. In addition, comparing methods employed by different people will help all those concerned to think globally, enlarging the horizons for each of them.

At the end of each case study, 'classroom activities' are proposed that will help the teacher incorporate the case studies throughout the course.

When discussing a particular project in class, the teacher could invite the children to respond by asking them to locate the country in question on a map and compare them with their own situation. Finally, tasks including drawing assignments, questions and answers and role-playing could be assigned to complement the study.

The words underlined throughout the text are explained in the glossary at the end of the collection.

Happy reading and good work! You'll see. Combating desertification bears fruit!

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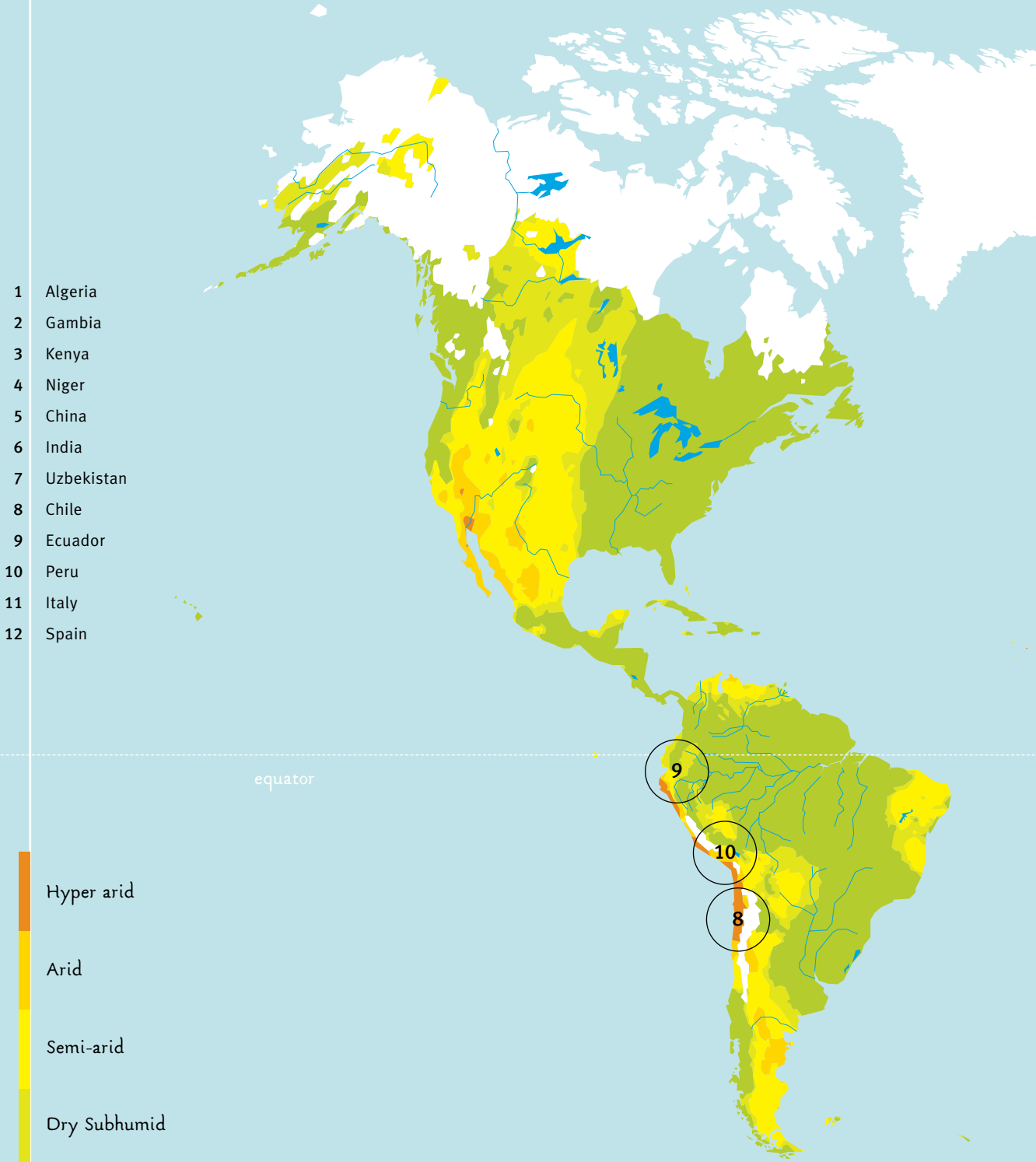
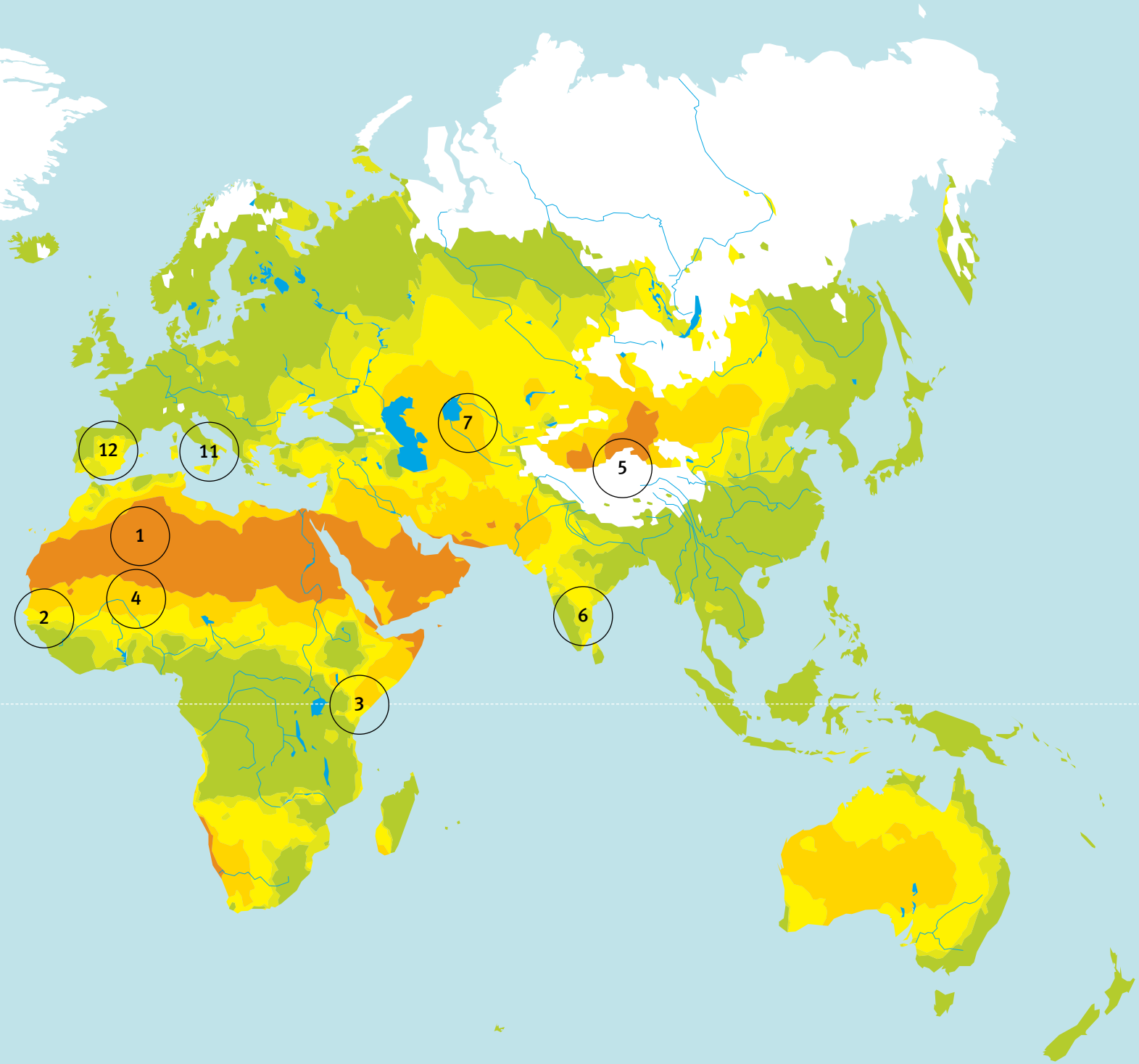
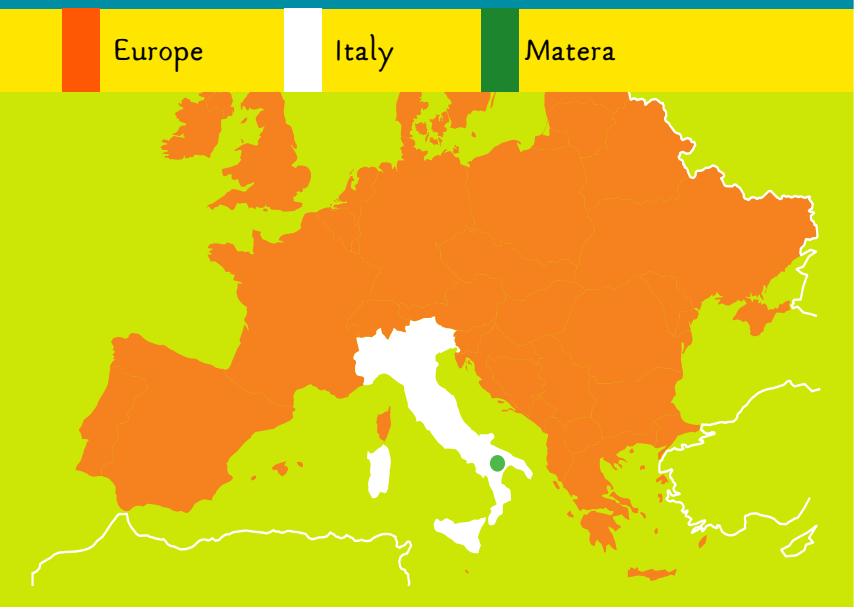
World Map of Aridity Zones





Source : CRU / UEA, UNEP / DEWA

COUNTRY DATA: ITALY



Region:	**Europe**
Capital:	**Italy**
Surface area:	**301,318 km²**
Population:	**57,343,000 inhab.**
Population density:	**191 inhab./km²**
Infant mortality rate (per thousand births):	**7**
Fertility rate (births per woman):	**1.2**
Population growth rate (per annum):	**0.0 %**
Life expectancy ♀ – ♂:	**81 – 75 years**
Average temperatures (min./max.):	**-1,9 / 28,9°C**
Forest cover:	**22 %**

The Sassi of Matera

Over the centuries, the low water levels in rivers and groundwater reserves, alternating with violent and intense rain, has rendered the practice of conservation of underground sources of water and water collection indispensable. The case of Sassi of Matera is a perfect example of how the regional natural topography favours this type of dwelling. The town is constructed on the edges of profound ravines, the Gravine. The inhabited areas are not situated at the foot of the canyon as might be expected, but on their steep flanks and at its summit. In fact, water coming from rain and frost is collected by the drainage system and in caves, unlike water used for drinking and cooking, which comes from river sources.

To maximize the use of rainwater, the dwellings are constructed around a courtyard. Here, a large tank for the community is dug out that collects water from the roofs, the edges of which never go beyond the walls of the houses. Because the roof is part of the stone work, not a single drop of water is lost. It is then channelled directly to the tank by means of descending terracotta canals (Photo 3).

Galleries radiating from these central wells maintain a constant temperature throughout the year and constitute an ideal refuge for people and livestock as well as serving as perfect storage places for wheat and water.

Photo 2. Tumulus structures and arches carved from the rock.

Another type of dwelling and method of collecting water is formed from simple piles of stones or created by vaults carved from the rock (Photo 2). These structures are formed in tumulus. These devices fulfil their function during the day as well as at night. During the day, the high humidity winds percolate into the spaces between the numerous stones.

COUNTRY	THEME	EXAMPLE	SOLUTION
Italy	Water collection	The Sassi of Matera	Rehabilitation of traditional systems

A judicious system of water collection:

The restoration of ancestral techniques in Sassi of Matera

Photo 1. A town carved entirely from chalk stone. Sassi means "stones" in Italian.

Matera is a town famous for its traditional urban system. Located in the heart of the Basilicate in southern Italy, it owes its celebrity to its exceptional historical centre called the 'Sassi'.
The Sassi, meaning literally 'stones', make up a town carved out entirely from chalk stone. The traditional dwellings are formed from the actual sloping wall of a deep ravine.
The techniques used to hollow out the chalk plateau and to collect water, employed up until contemporary times, appeared in the Neolithic era.
The ingenious arrangement of stones helped create natural ventilation systems and the collection of water from humidity. The evolution of archaic structures for the collection of water in towns is responsible for the Sassi of Matera found today.

COUNTRY	THEME	EXAMPLE	SOLUTION
Italy	Water collection	The Sassi of Matera	Rehabilitation of traditional systems

Photo 3. The roofs are part of the stone work; not a single drop of rain is lost. © Pietro Laureano

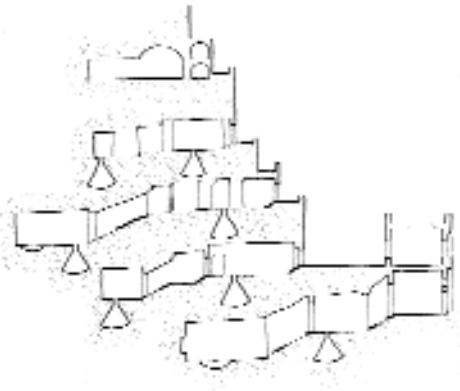


Figure 1. Bell-shaped water tanks are inter-linked by canals across several levels. © Pietro Laureano

The inner wall not exposed to the sun remains cooler than the outside. The drop in temperature brings about condensation of the droplets that fall into a cavity. The water accumulates, providing humidity and a cooler environment, which enhances the effectiveness of condensation. At night, the process is reversed, the exterior is cooler than the interior and condensation occurs, producing similar results. The humidity condenses and produces frost on the exterior of the dwellings. The following day the frost melts and filters down between the spaces into the cavity.

The system of dwellings of the Sassi of Matera has been constructed from prehistoric techniques by combining various principles for the collection of water: its capture, percolation and condensation and is thus adapted to its surroundings. During the violent rains, the terraces and the system of water collection protect the slopes from erosion. During the dry season, the hollowed out cavities work like an "inhaler" of air humidity (system explained above).

There are about ten superimposed levels accompanied by ten bell-shaped tanks linked between them by canals and water filter systems (Figs. 1 and 2).

The vertical development of the town means that the effect of gravity is used for the distribution of water while protecting the dwellings from the sweeping winds of the high plateau. The network of pathways, steps and underground passages continues to follow the ancient hydraulic structure.

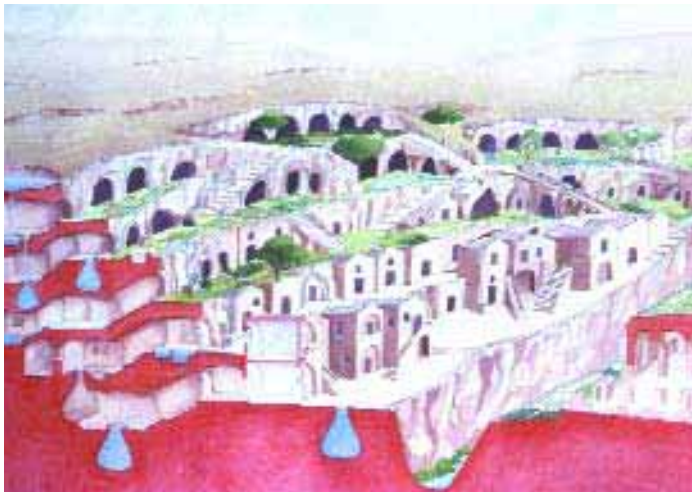


Figure 2. Illustration of the vertical structure of the Sassi of Matera

Causes and effects of abusive modernisation

During the 1950s the Sassi of Matera was closed due to their neglected condition, and the 20,000 inhabitants were moved to other neighbourhoods. The abandoned houses became the property of the state and a wall was erected to prevent them from being occupied.

The Sassi of Matera was transformed into a ghost town, the greatest historical troglodytic centre in the whole of Europe was completely abandoned. The dwellings were neither occupied nor ventilated, leading to rapid degradation. The churches carved from the rock and decorated with beautiful medieval frescoes soon crumbled away as a result of theft and pillage.

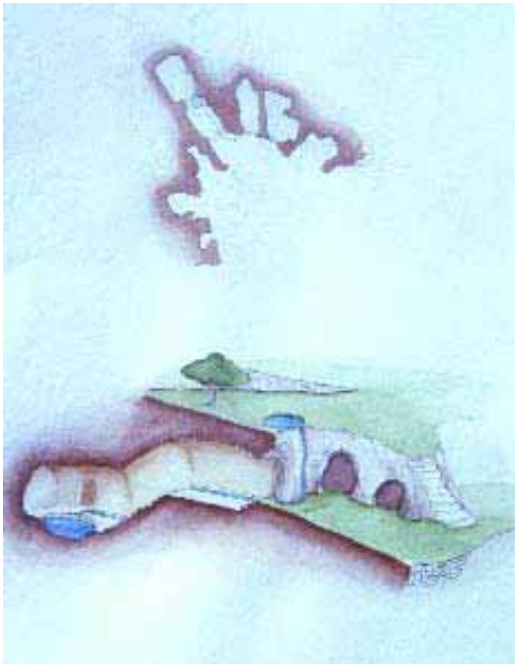


Figure 3. Galleries radiate from the courtyard wells. The last section is designed to collect waste to make humus.

Possible solutions

In 1986, largely thanks to the motivation of individuals involved in cultural activities, the Italian Government allocated 100 billion lires to restore the Sassi and to undertake the work necessary to improve its sanitary conditions and urbanization, and to encourage private individuals to take up residence there. All the state properties were entrusted to the Mayor of Matera, responsible for financing the project.
The turning point in the management of the Sassi came about with their inscription in 1993 as an UNESCO World Heritage Site. Matera became a destination for both national and international tourists and the individual requests to return and live in the Sassi multiplied. The Mayor of Matera equipped the Sassi with a network of water systems, drains, gas, electricity and telecommunications whose cables were buried in underground trenches so not to disturb its architectural qualities or the landscape. Around 3,000 people now live in the typical cave-homes, half- built, half-hollowed out.

The restoration of traditional systems of water collection

The Sassi of Matera illustrates the natural resource management capabilities (water, sun and energy) that were once perfectly employed but are so often neglected today.

The international debate on urban development makes this problem current and relevant. It is necessary to maximize the potential of a town at a local level to assure its harmonious and sustainable development. It is for this reason that the Ministry of the Environment chose Matera as an urban rehabilitation model within the framework of the Rio Conference and

the United Nations Convention to Combat Desertification (UNCCD), in its directives and action plans.

The very encouraging experiment in Matera could be adopted in other urban centres such as the inland region of Lucanie and the dwelling systems of the Gravine (canyons). Indeed, these sites offer similar architectural and environmental characteristics but have not benefited from similar renovation. Above all, this experiment is an exceptional example for those countries situated on the southern Mediterranean rim. In these countries, the progress of modernization often destroys traditional methods of managing space and threatens the ecological equilibrium of the whole region. Only by demonstrating the success of rich industrialized countries, like Italy, to restore traditional systems can countries that are less industrialized, be persuaded to do the same.

Conclusion

The objective of the international campaign to restore the Sassi of Matera was to revive innovative traditional methods:

- **the restoration of tanks for the use of rainwater.**
- **the use of terraces supported by walls to prevent landslides and land degradation.**
- **the rehabilitation of hanging gardens to provide green urban spaces.**
- **the reutilization of caves and cavities for natural ventilation.**

These measures do not imply that modern techniques should be ignored, but that these traditional techniques can also present sustainable solutions for the future.

Photo 4. In the 1950s, the Sassi dwellings were completely abandoned transforming Matera into a ghost town.

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Classroom ACTIVITIES

The teacher explains the Sassi of Matera in class.

Where is Italy?
Is your country on the same continent as Italy?
What distinguishes the southern European climate compared to your country?
Are the problems of desertification in Italy the same as those found in your region?
What are the differences?
What are the similarities?

Draw the Sassi of Matera on the hill (see photos and illustrations in the study) with their multi-layered houses and water reservoirs.
Draw the flow of rainwater leading to the reservoirs in the courtyard.
You can add your picture to the wall chart (See *Teacher's Guide*).

How is water condensation produced?
Ask an adult (teacher, parent) to boil water in a pan. Collect the water vapour by pivoting a glass or ceramic object over the vapour. Ask an adult to perform this task.
Did you notice how water trickles down the ceramic/glass object due to the effect of condensation? In your view, is there are a difference in temperature between the object and the boiling water?

What characterizes the temperature of the inside of a cave compared to the outside?
Perhaps you have visited a cave and have noticed the difference in temperature. In general, how is the water temperature different from the temperature of the surrounding air?
If possible use a thermometer to accurately measure the temperature. Give examples where you have noticed these differences in temperature?

How would you construct a house that allows you to collect rainwater falling on the roof. Describe the shape of the roof. How would you position the receptacles to collect the water? Would it be possible to collect rainwater from your school roof and/or your home?
Discuss this with your family (See cartoon: *There is No Rug Big Enough to Sweep the Desert Under*).