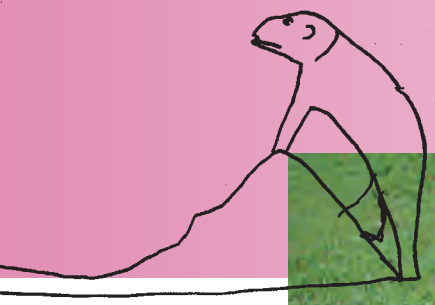
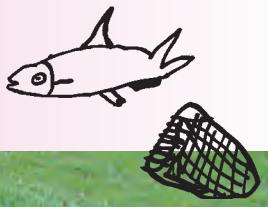
Chapter 8
Current pedagogical methods and tools applied in ESD





Chapter 8

Current pedagogical methods and tools applied in ESD

ESD includes many interesting and innovative methodological approaches based on active participation and experiential learning. Learning that is based on learners' experiences and initiatives is considered to be more effective (Trikaliti & Palaiopoulou, 1999). This chapter presents the most widely-used methods appropriate for ESD programmes in designated areas.

8.1 Field visits and research

Two of the most common methods of educational programmes in designated areas are the *field visit* and the *field research*. The term "field" refers to the natural, cultural and social environment including a wide range of sites (such as wetlands, coasts, streams, forests, neighbourhoods, settlements, rural, archaeological and industrial sites, etc.) appropriate for implementing an ESD programme. Direct experiential activities organized in the field, provide learners with the opportunity to gain a better understanding of the complex interrelations between the natural, cultural and economic environment. Especially for students, such activities bridge school knowledge to real life.

In formal education field activities are those that take place outside the typical classroom. These can be either "field visits" or "field researches", the former being more of an excursion or guided tour and the latter involving a strong research component.

1. Field visit to the *Khanasser Valley* region, 5th SUMAMAD Project Workshop, Syria
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For a field visit to be effective and not simply another excursion, it should be conducted with a specific objective or task, depending on ages and interests of the learners and on the area of the visit. Field activities must be meaningful, stimulating and provide learners with an opportunity to interact with the area (Marcinkowski et al., 1990; Kamarinou, 2000). For young children, who are curious and enthusiastic, the activities should aim to the development of their interest in the environment, particularly through the senses. Adolescents and adults are able to conduct more complex and demanding tasks (Lahiry et al., 1988).

For example, in a small river or beach where illegal waste disposal is tolerated by the local residents, a field visit should aim to look at the consequences of uncontrolled waste disposal. While primary school children can be involved in observation, collection, taxonomy, and drawing activities, secondary students can take part in activities such as sampling and laboratory analysis, surveying the local residents' views, etc.
Table 14, p.166 presents some activities that can help cultivate observation skills during ESD field activities which can be altered depending on the target-group.

Organizing a field activity in a MAB BR or a DA

Whether it is a simple visit or a complex research project, every field intervention can be broken down into three stages: *before, during and after* the visit: for each one the ESD educator is called to organize a series of actions so that the activity is successful and effective.
Based on the existing literature, a series of such activities for all three phases follows. These should be adapted depending on the target-group's composition, the status of the ESD educator (whether a CEE officer, MB officer, teacher etc.), the nature of the field (urban or rural), etc.

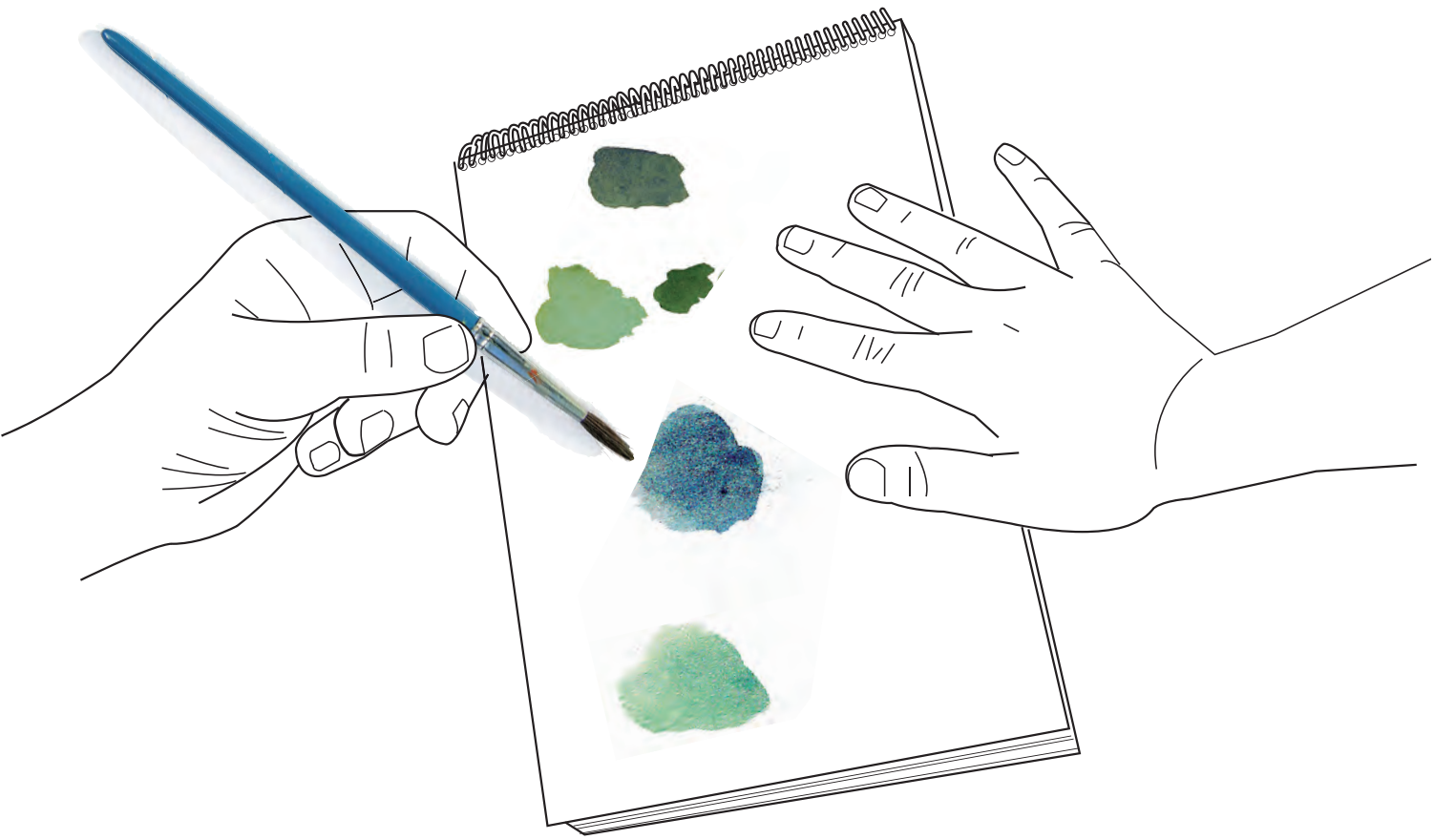
Stage A: Before the field visit

The overall design of a field activity follows the same stages as any educational programme as discussed in paragraph 7.1. First, the activity's objectives must be determined: For example, what is important for learners to study "in the field"? The state or "health" of the ecosystem? Its biodiversity? Its relation to the cultural diversity? Its potential to develop ecotourism activities?
For the case of students this objective should be linked to the school curriculum. Often, the field activities constitute part of a larger ESD programme.

Figure 21
Accumulated waste and biodegradation times

2. Waste and litter in the river, Italy
© UNESCO / Alexis N.Vorontzoff

3. View on *Cap Canaille*, *Cassis* region, France
© Hélène Gille



The field activities, worksheets, etc., are designed with the objectives and the target-group in mind. A field visit can also cover management, safety and legislative issues in addition to the basic educational themes. Finally, the ESD educator must have solid background knowledge of the site including access, the condition of the paths, and the offered services (lodging, restaurants, washrooms, etc.).

In cases when the programme is coordinated solely by the teacher, he/she must visit the site beforehand to examine its possibilities and limitations. Coordination involves contacting the Management Body (if any), the authorities to approve the visit (school principal, parents, etc.), insuring the learners, ensuring the needed escorts and estimating the costs (transportation, meals, lodging, materials for activities, etc.).
The more the learners themselves are involved in the planning, the greater their interest and commitment to the programme. For this reason, it is highly recommended to design and implement pre-visit activities: For example learners may collect information for the site (what type of designated area it is), study maps, watch a documentary on the area, study a threatened species of the area, practice the skills acquired for the field visit (e.g. using a hygrometer), etc.

Ideally, the ESD educator (staff of the MB or the CEE) should meet with the learners before their visit to discuss the field activities. During this session, the educator informs them on the personal items to bring in their backpacks (e.g. appropriate clothing, sun block, snack, water, etc.), the materials needed for the field activities (e.g. lenses, worksheets etc.), the particularities or dangers of the area (e.g. difficult access, slippery footpaths, etc.), as well as the code of behaviour of the visitor (see parag 6.6). In practice the educator rarely meets the team in advance. Even so, the escort (e.g. teacher) should insist that the educator sends to the group preparation material prior to the visit.

4. SUMAMAD workshop participants, *Jabbul Salt Lake* conservation area, Syria
© Ma'en Al Smadi

At this stage, the ESD educator also prepares the worksheets. In case the visit is part of a school's wider ESD programme, it is likely that the learners have already formed specific questions they wish to explore in the field, and these must definitely be included in the worksheets. Although there is no rule on the size of the worksheet, it should be brief and concise as its size may deter learners.

Learners' behavior in the field must also be discussed in advance. The discussion may begin by writing the following on the blackboard:

"We leave nothing but footprints, we take nothing but memories."

Generally, a visit to a BR is a good opportunity to cultivate environmental awareness and sensitivity. For example, when the activity includes sampling, learners must be aware of the consequences of their actions ("What happens if I remove a rare species or step on it?"). Of course, the code of behaviour changes from place to place; different behaviours are expected in an archaeological site, in forest or in a factory. In any case, agreeing on behaviour rules by using a **contract** strengthens the learners' sense of responsibility.

The Contract
This is a tool that is implemented at the beginning of a programme, particularly with young children. Rather than the educator setting the rules, children are asked to create their own behavior code which may include rules for interpersonal relationships, team functioning, behavior in an archaeological site, etc.
The educator asks questions such as: "What do you think we are allowed to do in this area and what not (and why)?"... "What's the best way to communicate while we are working in groups?"... "What should we do when we want to speak all at the same time?" etc. The educator then leaves it up to the children to decide on a common behavior model.
If during the programme someone misbehaves, the educator reminds them of their common commitment to the contract terms. For younger learners, the contract takes on the form of a game. Children are asked to write the terms on a large sheet of paper and then everybody signs it. For adolescents, this process is conducted orally.

Table 14
Examples of field activities designed to sharpen observation skills to be incorporated in ESD programmes for MAB BRs, Protected Areas (PAs) or other Designated Areas (DAs)
(adapted from Kamarinou, 2000 and Cornell, 1994)

The telescope
An activity that helps learners focus on observing details: "Using your hand, make a telescope: close one eye and try to see the details of the surrounding area with the other. Is there something you haven't seen until now?"..."What is the strangest thing you see? The most beautiful? And the ugliest?"

Chirping
In a forest or park, learners lie on their backs holding their arms up in the air with closed fists. They close their eyes and concentrate on the sounds they hear. Each time someone hears a new chirping sound, he counts it by raising a finger: "Who then has the best hearing? Can you count to ten without hearing a chirp?" For variety, any sound can replace chirping (leaves rustling, water running, city hum, etc.).

Colours
To develop observation and concentration, learners are asked how many different colours or hues they can see from where they are sitting.

Taxonomy - Classification
By asking questions about an object's characteristics, learners observe and discover details in their surroundings. "How many green things can you see?"... "How many metallic objects?"... "How many are old?"... "How many are man-made?"... "How many are recyclable?"

Camouflage
In a forest, 10-15 man-made items are placed along a 20 meter footpath. Some are conspicuously placed while others are hidden among foliage having the same colour as the object. The number of objects is not disclosed. The learners are then asked to cross the path, one by one, keeping a distance between them (so whoever is behind cannot see what the person in front is doing). They attempt to locate (but not collect) as many items as possible. At the end of the path, they are asked to whisper how many items each saw. If no one person saw all the items, they are told that there are still more they haven't found and they return to the path. A discussion on how colours camouflage animals follows.

Treasure hunt
This is an activity that helps familiarize learners with the field area and its natural cycles. First, the work area is bordered off; learners are in pairs and are asked not to remove anything from the area but only to note down what they see. The activity concludes with the ESD educator asking random questions. Questions may include:
Find something NEW • Find something FRAGILE • Find something OLD • Find something BURNT • Find something DEAD • Find something DEHYDRATED • Find something that is GROWING WITH DIFFICULTY • Find something that is DECOMPOSING • Find something that is INFLUENCED BY MAN • Find something that is JUST STARTING TO GROW • Find something that is AFFECTED BY ANIMALS • Find A PLACE WHERE NOTHING GROWS.

Alternatives
In order for learners to imagine alternative forms of the area, they must first observe it in a systematic and critical way: "Can you imagine what this place would be like if there was no concrete, no electricity, no aluminum, no roads, no green or no available water?

Interventions
Learners are asked to mentally change something in the surroundings in order to satisfy their own needs. Encouraging observation skills, expressing needs and critical thinking are additional skills that are cultivated. "What would you add to the surroundings to make it more familiar?"... "Is there something you would like to change in this factory, square, neighbourhood, forest? Why?"

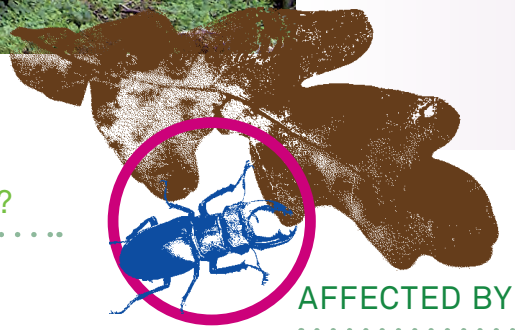
5

SOMETHING DECOMPOSING ?

SOMETHING DEAD ?

5. Woody climbing plant on tree, *Bourgogne* region, France ©Hélène Gille

6. Seedlings on an old tree stump, *Bourgogne* region, France ©Hélène Gille



AFFECTED BY ANIMALS ?

JUST STARTING TO GROW ?

6

Table 15
Actions to be taken by teachers/escorts and the receiving organizations for field visits

Teacher (for students) / escort (for adult visitors)	Reception Officer (Management Body of MAB BR, PA, CEE, etc.)
...calls MB requesting information on educational programmes implemented in the PA; ...at the same time informs MB officer on issues such as: - age and size of the group; - any special considerations (e.g. children with physical disabilities, allergies etc.); - any related activities already implemented in the classroom; ...selects appropriate programme to meet group's needs or creates a new programme in cooperation with MB officer, if necessary.	...lists all ESD programmes implemented by his/her institution with information on each, including: - brief description; - targeted ages; - programme duration; - appropriate season for implementation; - difficulties, risks involved; - possibilities/limitations for persons with disabilities; - recommended group size or escorts-learner ratio; - cost, possible materials needed.
...obtains transportation information initially from MB officer; ...then follows up with travel agency, port authorities, etc. ...is informed on lodging in the area initially by MB officer; ...explores accommodation availability during time period of the visit.	...notes PA transportation information, routes, travel time, etc. ...maintains updated list of helpful contact numbers (e.g.travel agency, port authorities, etc.); ...maintains a telephone contact list of nearest lodgings if the group overnights; ...provides other information such as distance between accommodation and PA, any information regarding the movement of persons with disabilities, etc.
...books dates for visits; ...informs on group make-up and on any particular considerations (see above).	...maintains detailed calendar of visits, including information on group visiting the PA along with name and contact number of group escort.
...informs on supplemental material and on suggested pre-visit activities; ...coordinates preparation activities with group (in the classroom or elsewhere); ...is informed on any additional material and equipment that learners may need to bring.	...ensures a sufficient number of material/activity kits for each programme to be used in preparation for the visit (e.g. video, slides, activity sheets, board games, etc.) and sends to participants before visit; ...informs students/visitors on any additional materials that may be necessary to bring for field activities.
...obtains any necessary travel permits and consent forms (from parents, EE Division, school administration, insurance etc.).	...informs all MB officers on planned visits.
...a few days prior to the visit, informed on weather conditions (internet, contact with the MB), informs team members of appropriate clothing and equipment to bring.	...informs on weather conditions for the day of the visit and on the forecast for the next few days.
...before departing, ensures he has: - telephone contact list of students' parents; - contact list of MB, travel agency, hotels, etc. preparatory material to be returned to the MB.	...lists all ESD programmes implemented by his/her institution with information on each, including: - brief description; - targeted ages; - programme duration; - appropriate season for implementation; - difficulties, risks involved; - possibilities/limitations for persons with disabilities; - recommended group size or escorts-learner ratio; - cost, possible materials needed.

7 - 8. During the field visit in *Bourgogne*, *Ecole Steiner-Waldorf*, *Verrières-le-Buisson*, France
©Hélène Gille

Stage B: In the field

By having learners play games or by asking them questions, the programme can begin on route to the visit site. For example, while still on the bus as we approach a wetland we ask "Which elements show evidence of human intervention?" In other cases we request them to gather hidden objects on their way to the site, etc.

After arriving at the field, there are two alternatives:
a) For adults or groups who are not acquainted with one another, ice-breakers and team building activities should take place before the planned field activities begin (see parag 6.5).
b) For students, it is a good idea to start with some physical games so that they unleash their "high energies" and become relaxed in a pleasant way.

Re-directing the children's natural high energy or an adult's sense of apprehension will help both the group and the ESD educator become better acquainted and at ease, allowing them to focus their attention on the activities to follow. At this point, the learners implement the planned activities, usually in small groups with the guidance of the educator. Mapping, sampling, measuring with instruments, interviewing local residents or visitors to the area are some typical field activities.

Recording data in **worksheets** is recommended even in the case when the visit lacks a sound research character, because the process helps learners remain focused on the task at hand. Completed worksheets also help compile feedback after the visit has ended (e.g. back in the classroom).

In any case, it is a good idea to briefly discuss the worksheets in a plenary before the end of the educational programme. This helps to summarize key findings of the visit and to clarify any questions (task evaluation). Learners must also be given the opportunity to talk about their experiences in the field (process evaluation) with a planned reflection activity (orally, in short texts, through a physical game, etc.).

The Worksheet
The worksheet (or activity sheet) is a useful tool not only in field activities but in various educational projects and curriculum subjects. The use of worksheets is appropriate even when the fieldwork does not have strong "research" nature and should:
- Be maximum one page long.
- Be clear and understandable to all.
- Guide the work of the group.
- Stimulate reflection.
- Include data i.e. name, group's name, location, date and time.

The content depends on the objectives, the age of learners and the nature of the 'field': e.g. if the visit site is a human construction, like a factory, the worksheet questions may refer to the consecutive stages of production, operation, staff, health and safety measures of the employees, benefits and environmental consequences, etc. If it is a natural site, e.g. a river, the worksheet questions may refer to the flora and fauna, geomorphology, state of the ecosystem, identification of environmental problems (e.g. pollution, erosion), and how it all connects with human activities, etc.
A worksheet example is provided in the Annex.

"BASE Project" in the field
The BASE Project is a suitable technique used in team work in the countryside, applied systematically both with students and adults. The BASE is a space where all the necessary equipment and pedagogical materials for the activities' implementation are gathered (e.g. instruments, maps, binoculars, photographs, guide books etc.) usually on a table, in a tent or in a suitcase. The coordinators remain at the BASE while the learners work in teams nearby. The BASE has multiple functions: it constitutes the work table, the library, pharmacy etc. It is also a place for asking questions, reconsidering preconceptions and negotiating action strategies. At the same time, it is a place that learners consider as "their own" marking their own presence in the given environment (Psallidas, 2003).

Table 16
Group development model (adapted from Tuchman, 1965)

Forming – Storming – Norming – Performing are the four subsequent phases in small group operation and capability to plan work, tackle difficulties, and deliver results. Many long-standing teams repeatedly go through these cycles as they react to changing circumstances. In some cases, particularly with adults, it is helpful to inform the group of these stages right from the start, as this will enhance their metagnostic self-reflection skills during group work. The four phases are briefly described.

Forming – In a newly established group, its members are usually informed about the opportunity and challenges of group work, they agree on goals and begin teamwork. At this stage most members' behaviour is driven by a desire to be accepted by others, avoiding controversy and strong feelings. They tend to focus on routines and organization aspects i.e. their roles in the group, meetings' plans, etc. At the same time they get to know each other, the scope of the group tasks and how to approach them. This is a comfortable stage to be in, but the avoidance of conflict and threat means that not much actually gets done.
In this phase the supervisor usually asserts a controlling, directive role to guide teamwork. He/she monitors how each member works as an individual, as most members yet behave quite independently.

Storming – In this stage group members open up and confront each other's ideas and perspectives, therefore conflict may arise. This can be contentious, unpleasant and even painful to some. So, tolerance and patience are prerequisites that need to be emphasised; otherwise the team might lose motivation and fail. The groups eventually resolve their differences so that members are comfortable to share their views without feeling judged in any way.
In this phase the group addresses the issues to be resolved, how they will function independently and together and what leadership model they will adopt. Team supervisor may be more accessible but tend to still need to be directive in their guidance for expected group behaviour. The maturity of all or some members determines if and when the team will move to the next stage (some groups never do).

Norming – At some point, the team may enter this stage, where members adjust their behaviour to each other and develop habits that make teamwork seem natural and fluid. In other words they set the norms based on agreed rules, values, professional behaviour, working methods and even taboos. They begin to trust each other and motivation increases as they get deep into their projects.
In this phase teams run the risk of groupthink: this occurs if the norming behaviours become too strong and members restrain from expressing any extreme view points in order not to sound foolish or not to upset the group's balance and coherence.
Supervisor in this phase tends to be less guiding, as the members take responsibility, and start to feel a sense of achievement as a unit. However, some team members may feel threatened by their responsibilities and try to resist pressure by reverting to storming.

Performing – Some teams reach the high-performing stage, where they function as a unit, finding ways to get the job done smoothly and effectively without inappropriate conflict. Team members are now interdependent, knowledgeable, motivated and able to handle the decision-making process without supervision. Dissent is expected and allowed as long as it is channelled through means acceptable to the team.
Even the high-performing teams may revert to earlier stages in certain circumstances, i.e. when a change in leadership alters the team norms and dynamics.

9

10

9 – 10. Class 6 at *Colveston Primary School*, *Hackney*, east London, U.K. © UNESCO / Paul Highnam

11. Group activity to produce collective artistic work, *Balkan Botanical Garden of Kroussia*, Greece
© MIO-ECSDE / M. Vogrin

12. Selective plant collecting in the field, *Bourgogne* region, *Ecole Steiner-Waldorf*, France
©Hélène Gille

Finally, it is important to incorporate sufficient free time into the programme, especially when the field is the natural environment and the learners are children. The reason for this is that interventions that take place in the countryside also serve a basic human need which has been suppressed by modern urban life - the joy and pleasure of being in nature.

Stage C: Following the field visit

Activities at this stage primarily refer to what students will do once back in the classroom but also to adult groups (youth, or elderly, nature groups etc.) after an organized visit. Post-visit activities may include synthesising and interpreting results (worksheets), presentations before the entire group or a wider audience, a poster composition, writing an article with recommendations, holding a photo-show evening over drinks etc. Often the group chooses to make the outcomes and the proposed solutions known to involved stakeholders that could be their fellow students, their families, the municipality, the management body officers, etc.
Particularly for cases of students, when possible it is recommended that the ESD educator visits the class and conducts appropriate post-visit activities. Even if this is not possible, these activities must be available to the class teacher him/herself. In any case, it is possible that the field visit raises new questions to students and may trigger a new circle of investigative activities.

8.2 Working in groups

Working in groups encourages learners to communicate, participate and learn to share and cooperate -all very important parameters of any ESD programme. Through teamwork, learners regenerate their own ideas in an ongoing dialogue by sharing opinions and reactions with others. Through this process they can usually develop choices that may not have otherwise arisen had it been through individual efforts. In teams, learning activities, making contact and ultimately taking action are interrelated in a natural way. Group work also develops in negotiation and decision making techniques and strengthens the members' commitment to such a decision (Matsagouras, 2000).

However, a team project that is not well-planned or is sporadically implemented may produce poor results. Another possible drawback is the possible low participation of some members (Smith, 1998; Kamarinou, 2000; Glascow, 1994).

According to the proposals of Smith, 1998; Kamarinou, 2000; Seebach, 2001; Kokkotas, 2002; Matsagouras, 2003a; Jaques, 2004; Scoullos & Malotidi, 2004 those who design and implement group work activities, should keep in mind the following:
• A group functions more effectively when its parameters vary including age, gender, nationality, number and role of members, school performance (for students).

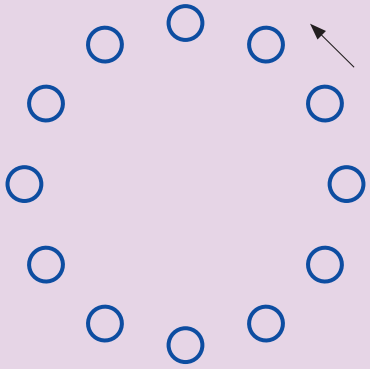
13. Picking up limited plant samples, *Bourgogne* region, *Ecole Steiner-Waldorf*, France
©Hélène Gille

14. Hand clearing in the field, *Bourgogne* region, *Ecole Steiner-Waldorf*, France
©Hélène Gille

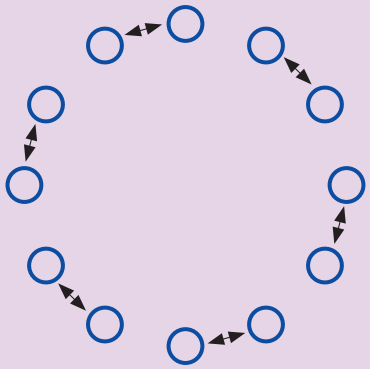
• There are no fixed rules as to the size of a group. This depends on the task, the objectives and nature of the field each time. Some consider four members as a happy medium (particularly for students), and advice for groups not to exceed seven members.
• Large groups (i.e. a class of 25) are slow, with a complex system of communication and a low level of individual participation. Dynamic coordination on behalf of the instructor is necessary for successful group work.
• As the number of members is reduced, so does the quantity and quality of ideas expressed. On the other hand, in small groups, members feel more familiar to each other and participate more.
• For some educational activities it is a good idea to interchange between work in small and large groups (i.e. plenary for a class of 25 students), so as to get the advantages of both processes.
• The members of a newly formed group need time and energy to familiarise with each other, to understand their given task as a group, and to develop proper cooperation mechanisms. The designer needs to include such familiarisation introductory activities.
• In teams usually one member tends to take on a leadership role making the others less active. This is not necessarily negative as that particular member develops leadership capabilities. Nevertheless, the instructor should try to maintain a balance by delegating duties to everyone in the group, avoiding, however, confrontation with the "leader".
• By pre-arranging the group composition the instructor can encounter also the natural tendency of most people to group only with those most familiar to them. Different roles can be assigned to members, such as the recorders, the reporters, the timekeepers etc. These roles should be redistributed, especially during lengthy programmes.
• The project objectives and the members' responsibilities should be clear at the onset both on an individual and group level. The more team members take part in setting the objectives and rules of communication, the more committed they are to them (see learning contract parag. 8.1).
• It is important for the educator to identify ways to maximise participation, taking advantage of each member's abilities. It should be recognized that everyone does not contribute in the same manner.
• Depending on the project, it may be necessary to hold frequent inter-group meetings, where they inform each other on the ways they are approaching the objectives, the challenges they are facing, their working relationships, etc. Naturally, an environment of cooperation should be cultivated to avoid a sense of competition among the teams.
• Given that group skills are developed progressively, instructors should be patient and create an environment conducive to improving team work.
• In an environment of trust, group members are encouraged to express ideas, disagreements, feelings and questions and to make an effort to understand the views of others. In this context, conflict is a normal and expected part of the interaction and should be seen as an opportunity for creativity and for improvement.
• In cases of intense conflict between group members the educator should remind of the contract, and the commonly agreed rules of behaviour.
• Sometimes, especially in cases of adults, learners tend to throw discredit upon the instructor's stereotype role of expert (authority). The instructor should not get "trapped" in such conflict with a member. Instead he may try to bring the conflict between the two to the whole group by posing questions like "How does the group feel about this idea?" or even "What would you do if you were in my place (instructor)?"
• Generally, the functioning of a group should be examined and evaluated on two distinct, yet equally important, levels, the level of task completed and the communication level.

Table 17
Ideas on seating plans for group discussions
(adapted from Jaques, 2004)

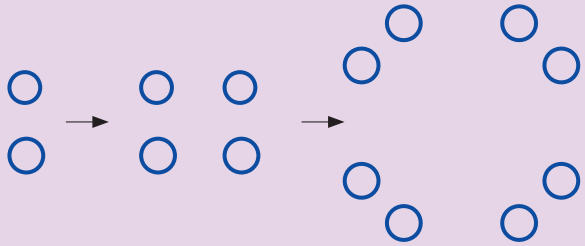
Round table discussion
Each member has a brief time period (e.g. 1 minute) to express himself on a subject. This is usually done at the beginning of an ESD programme to encourage discussion and again at the end as a form of evaluation. Discussion can be sequential by moving in one direction but it is far more interesting for the first speaker to choose the next speaker at random and so on. A ball or doll can be used by tossing it from one person to another (with the understanding that no one can speak twice in a row).



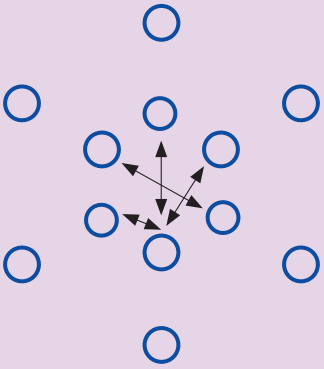
Simultaneous discussions in pairs
Usually applied in large group, members discuss with their partner and come to their own understanding of the subject. This method helps learners to express any difficulties they may be facing but do not wish to share with the entire group. May also serve as an ice-breaker with each pair introducing his partner to the group.



Discussion in progressively larger groups (avalanches)
Discussion in pairs easily widens by doubling progressively so that group interaction develops. The complexity of the tasks/questions should gradually increase in order to avoid repetition, fatigue or boredom. It ends in a circle with all the participants.



"Circle within a circle"
(appropriate for adolescents or older participants)
This arrangement can be compared to a fishbowl, and is better to be undertaken in the absence of instructor. The work of the two circles is different: The outer circle observes the inner group who are aware of being observed. The inner group conducts a cognitive activity (e.g. discusses a task to reach a proposal), while the outer group remain silent and keep notes on the inners' communication process (how arguments are raised, if someone develops leadership in the absence of the instructor, if discussion rules are followed, if someone is reluctant to speak out, how is the atmosphere of the conversation –warm, hostile, scientific etc.). At the end in plenary, together with the instructor the outer group gives feedback.



8.3 Conflict management within groups

Conflict is inevitable in groups and the way it is managed can have strong effects on group dynamics. Colloquially, conflict within a group occurs when two or more members try to occupy the same "space" at the same time. This space could be physical, i.e. the last empty seat in a conference room, or even psychological, where there are incompatibilities between members i.e. who will be the leader, which action strategy to adopt to solve a problem, etc. Conflict is not necessarily destructive: if managed properly it can be beneficial. In this respect, it is important for a group facilitator to understand it and be able to manage it constructively.
In the pioneer instrument developed by Thomas and Kilman in 1976, the authors detect the five options to address conflict: (i) accommodation, (ii) avoidance, (iii) collaboration, (iv) compromise, and (v) competition.

"Conflict is the process which begins when one party perceives that the other has frustrated, or is about to frustrate, some concern of his".
(Thomas, 1976)

Sources of conflict

There are various classifications of the sources and the types of conflict in teamwork that are beyond the purpose of the current publication. The conflicts that an ESD educator in a BR may encounter may stem from:
- *communication barriers* as a result of poor listening, age-gap, insufficient sharing of information, lack of clarity in goals and objectives, non-verbal cues that are ignored, lack of interest of some members, different communication styles of members etc.
- *structural disagreements* that include the members' roles and responsibilities, interdependency, level of participation, time management, and
- *personality factors* such as ego, self-esteem, personal value system and goals, and also how open, rigid or imposing the members may be.

On top of that, in multi-ethnic teams cross cultural conflict may rise, as a result of different race, ethnic group, religion, language, and the whole aspect of values, norms, social structures and stereotypes embedded in each culture (Ford, 2001). Certainly, an ESD educator is not expected to be able to solve efficiently any type of conflict, also because many are unpredictable. However, some of the abovementioned sources can be anticipated and impeded in the planning phase. For example negotiating the contract allows that a certain communication "code" is followed, and stating clearly team goals and objectives right from the start, safeguards from eventual misunderstandings and communication barriers.

How to address conflict

Developing preventive strategies is a useful tool for the ESD educator. Especially in cases when members do not know each other, designed team building activities, make them feel comfortable and start to trust each other. Accepting the difference of others is an important aspect that should be stressed. Sometimes, it is appropriate to discuss in advance how the group will address conflict if it happens; clarifying that it is a natural occurrence within teamwork. For lengthy programmes, regular team review sessions give members the opportunity to report of any communication problems, and address these directly.

When conflict arises addressing it directly is usually the best option. This task cannot be left to the educator, solely. As team members all engage in the process of resolution they build important communication skills. Of course, willingness by all parties to resolve conflict is a basic prerequisite, and ESD educators should keep in mind that this is not always the case.

Based on existing literature (Mitchell & Mitchell, 1984; Phillips, 1997; Ford, 2001; Townsley, 2005; Global Knowledge, 2006) are some suggestions to resolve conflict constructively:
- Bring the conflict in plenary. Discussing the issue that caused tension outside the group undermines trust and causes frustration to all.
- Put the conflict in perspective of the group goals: how serious the conflict is depends on how much it threatens the goals' accomplishment.
- Attack the issue, not each other and try not to take things personally. Being judgemental to people and their values is a destructive form of conflict.
- Concentrate on substantial facts, not hereby opinions. For example, use the phrase "Tom is often late at meetings" rather than "Tom is uninterested in our meetings."
- Acknowledge the others' position: one doesn't have to agree but should listen. Do not hesitate to ask questions to clarify aspects that you are not sure you understand.
- Seek to understand all angles of disagreement: individuals have unique frames of reference and they conceptualise the same situation (conflict) differently.
- Use direct confrontation (instead of indirect). For example, replace the phrase "People are not being honest about what is really bothering them" with "Sue, tell us what is..."
- Confront the conflicting party in a structured way: for example, "Tom (direct confront), when you are late for meetings (behaviour) it makes me angry (emotion), because your tardiness wastes everyone's time and the team is left behind in its tasks (reason for the emotion). What do you think?" (Wait for the response that should be also structured and not defensive). These types of rational statements defuse anger.
- Redefine the problem statement if other root causes or symptoms unveil with discussion. For example, some members may not do their assigned tasks not due to lack of motivation, but because they do not understand what is expected from them.

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15. Two young girls playing, Multi-etchnic school, *Belleville* area, Paris
© UNESCO / Inez Forbes

16. Young boys playing, Multi-ethnic school, *Belleville* area, Paris
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17. Two young girls apart, Multi-ethnic school, *Belleville* area, Paris
© UNESCO / Inez Forbes

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18. At the library, *Piran*, Slovenia
©UNESCO / Martin Bobic

19. Young boys playing rugby on the playground, Switzerland
© UNESCO / Max C. Oettli

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20. Lunch time, Multi-ethnic school, *Belleville* area, Paris
© UNESCO / Inez Forbes

21. *Os civila Kosmaca Piran School*, *Piran*, Slovenia
© UNESCO / ASPnet / Martin Bobic

22. Dialogue school, Kazakhstan
© UNESCO / ASPnet / Alexandra Galentro

- Continuously check the basis of your own perceptions. Several times our actions and beliefs are based on stereotypes. And sometimes even the person that caused the conflict does not acknowledge why he/she caused it.
- Put emphasis on areas of agreement, rather than disagreement.
- The team should not exhaust in an ever ending analysis: once the reasons of conflict are discussed, members should generate solution options.
- Some people always thrive on conflict and seem to enjoy it, possibly seeking to establish identity or power, or even because it is the only thing that energises them. These usually lack group commitment and intention to change. Open constructive confrontation by all members may be necessary to help these people take responsibility for themselves and make effort to even consider change.
- Conflicts with the group leader or the educator should be anticipated. The leader should be ready to accept negative criticism and be willing to learn from it, avoiding the trap to quit from his/her leadership responsibilities.
- Sometimes, particularly in cases of tense emotions or unpopular decisions, an authoritarian approach by the educator can be used. Other times avoiding or postponing the issue is more appropriate, especially when the conflict is of low importance or when time alone is expected to bring about a resolution. In any case, the educator should explain the reasons for his/her action -or non action- calmly and directly.

ESD educators know that a team has a great advantage over individual work, in terms of resources, knowledge and ideas. This diversity also produces conflict. However, if properly managed, conflict can become a source of innovation and a deep learning experience to all.

Using the cultural diversity as a positive element for sustainable development

In the Mediterranean region a great diversity of cultures and religions exist around the basin. The cultural and religions confrontation is one of the challenges of our time and such confrontation often appears within classes in modern metropolitan cities.

ESD can and should address this complex challenge, as confrontation provides a unique opportunity to get rid of stereotypes, xenophobia, and mutual negative representations. A corner stone of intercultural education is identifying what people have in common, in an open and inclusive dialogue. Suggested ESD themes that can be used to unveil and reflect on the differences and similarities include i.e. clothing, family, diet, languages, art and religion.

ESD educators should not forget that by learning about and respecting other cultures and religions we can all learn and fully understand the principles of our own culture and religion.

8.4 Brainstorming and making charts

Brainstorming ideas

Brainstorming is a technique used to explore spontaneous ideas generated by a group on any given subject in a short time. The subject can be either a question or a position clearly stated by the educator. Learners are asked, within a few minutes, to spontaneously express whatever comes in mind about the topic, using short phrases or key words. Alternatively they can write them on cards. All the words and phrases are written on the board by the educator or a group member appointed as the 'recorder'.

Some examples for brainstorms:
What do you assume are the causes of pollution in the lake?
What could the local community do to take advantage of the marsh?
How is deciding to protect an area similar to putting a treasured ring in a safe or your favourite cards in plastic sheets? (for primary level)

During the process, the educator:
- Encourages all participants to express their ideas and opinions. He/she stays alert to make sure to include an idea expressed in hesitation by a shy learner.
- Stresses that there is no right or wrong answers, and there is no "silly" reply as well. That is why there should be no criticism from the group on the ideas heard.
- Notes down all the ideas heard without comments. However, when an idea is vague, he asks for clarifications before noting down the key-word, to avoid misunderstandings.

23. Social Sciences class, Group discussion, *Bergen*, Norway
© UNESCO / ASPnet / Sigrid Alvestad

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24. *Karchaghbour River, Tsovak* region, Armenia
© Olivier Brestin

25. *Lake Santillana, Cuenta Alta del Río Manzanares BR*, Spain
© UNESCO / Olivier Brestin

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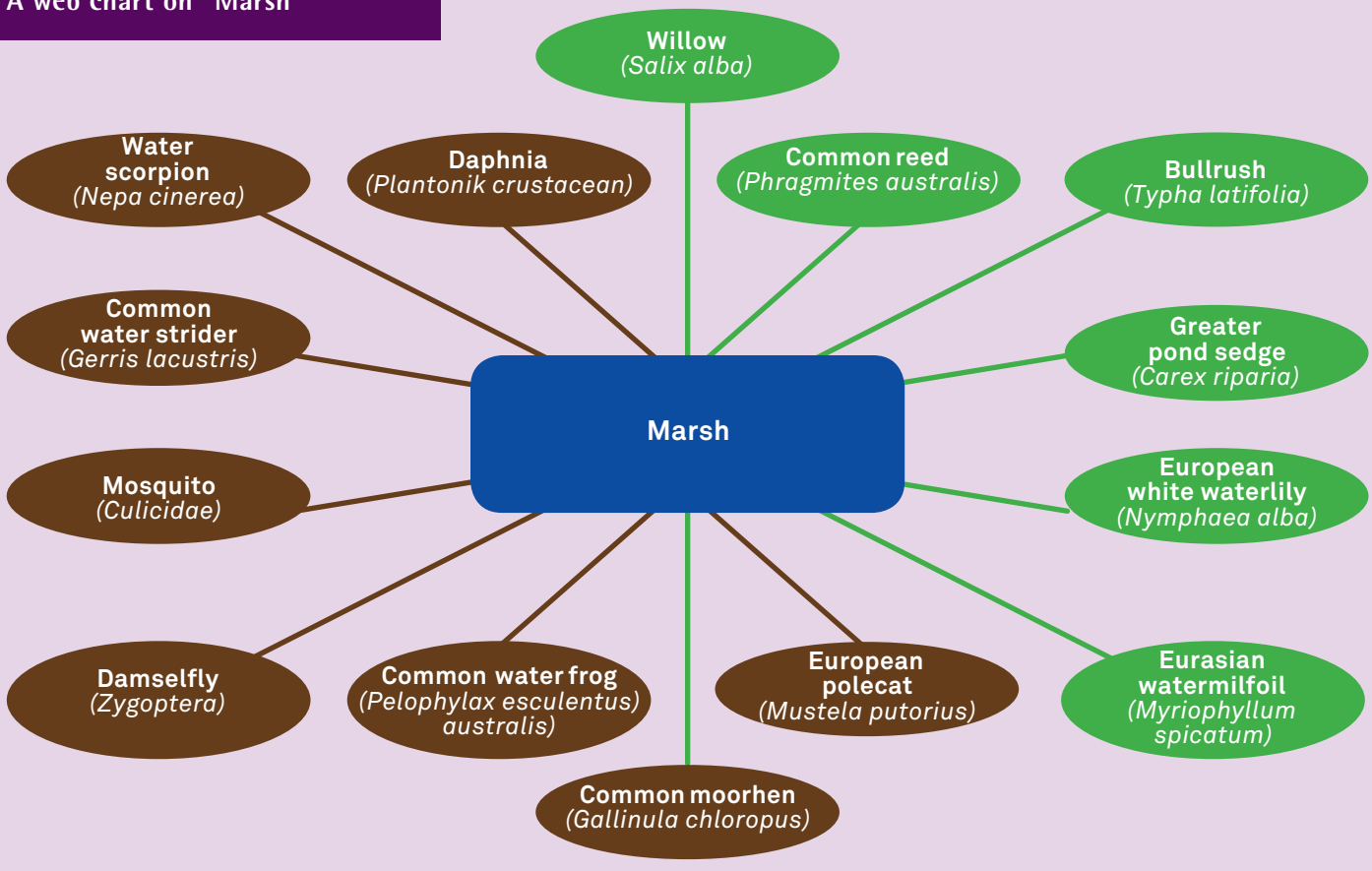
- Rephrases the questions or repeats some responses if the group runs out of ideas, avoiding to give new ideas him/herself.
- Allows no discussion until all participants have exhausted their ideas.
- Once all ideas are recorded, in plenary the educator verifies, categorises and even prioritises them, depending on the objectives of the activity.
- Last step is the reflection on the ideas and discussion on which ones may eventually be appropriate and applicable.

The technique creates an 'enabling environment' to exchange views and to keep the sessions lively. It involves directly those participants that express their ideas and indirectly those who listen to others' opinions self-

Chart 2
A web chart on "Marsh"



reflect on their own understandings. A challenge for the educator is to get everybody to speak out, even the shy ones. In these cases he/she can start by suggesting an absurd or silly idea to make everyone feel comfortable to express. For example, in the above theme of how to exploit a marsh one could suggest to collect mosquitoes and sell them to make profit ...

Brainstorming is neither time - nor material - consuming and can be conducted anywhere. It is appropriate for the detection of knowledge as well as attitudes regardless of the age of participants. The best results are obtained when participants have varying background and personality traits and when they have a general idea about the issue, without knowing it in detail. Within an educational programme a brainstorm can be applied at various stages so as to generate fresh ideas, to enliven an activity, to evaluate a process, etc.

There are some limitations to the method such as: sometimes totally inconsistent ideas are generated if the participants have none whatsoever idea on the subject; at times the process may lead to 'chaos' that is why it requires good facilitation skills; and in some cases ideas may be too vague because of lack of analysis.

Web charts

Key words or ideas generated during a brainstorming session or from a general discussion can be used in an organized way through what is known as a "thematic network", "web chart" or simply a "web". It is a chart with the main idea in the middle and all related *satellite-concepts* diverging from this central point. A web chart is considered as a flexible form of concept map (see parag 8.5); usually it does not include *connector words* between *satellites*, nor does it have a strict hierarchical structure, thus it does not reflect the relationship between concepts. It is mostly a diagram that can be used in order to schematically highlight the number of interconnections and the complexity of issues. It is a tool appropriate even for very young children where words can be replaced by images and shapes.

There are many ways to practice making web charts. One way is to give learners a partially finished web showing only the central idea and one or two satellites and have them complete it either individually or in small groups. Another way for those who are familiar with the method is to hand out the *satellites* only (as cards) and ask learners to suggest a logical web or, even, discover the central concept. (Alampei & Scoullos, 2007). For example, what would be the central concept of a web chart with the following satellites: production activities, carrying capacity, natural resources, conservation of habitats, science and research, monitoring, guarding, interpretation projects, monitoring systems, volunteerism, communication, monuments, infrastructures (see next page p. 182-183).

A web chart can be applied also as an informal evaluation tool. Used at the beginning of a programme, it helps learners' visualize existing views and preconceptions. Applied at the end, it is expected that it will generate more *satellites* and connections.

Possible brainstorming and web chart activities for an ESD programme for special designated areas

Physical game on trophic webs*
Children participate in teams representing certain concepts e.g. the swallow, the stork (or other birds that live in a designated area). They are tied together using a colored ribbon that represents the bird team. The bird team can be connected to the plant team (flowers, trees, bushes of the DA) using a rope held at the two ends by children from each team. Then all the children go under a common "umbrella" representing life in the DA. The children can also hold a card with their concept or a related drawing.

Brainstorming ideas and web charts for wetlands
This is a pre-visit activity that can be used to identify a group's preconceived ideas and knowledge before going to a wetland. During a session focused on young people's awareness of wetland protection, high school students were asked to provide any words that come to mind relating to the concept "wetlands". A web developed around the central word and once the first circle was complete, a discussion followed along with further analysis of the "satellites".

Creating a web-chart to detect the interests of learners
Assuming that the ESD educator has an idea on the central theme to investigate he/she may use this tool that starts from what learners themselves want to know. For example for the theme of faire trade the educator may collect characteristic photos depicting the stages of a faire trade product versus a contemporary one. In small groups learners are given out these photos, pined on a large piece of paper, and they are asked to write on this paper as many different questions as they can think of about each photo. A discussion follows in plenary on the key-issues that the learners decide to investigate in depth.

Chart 3
Biosphere Reserves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Production Activities


© UNESCO / O. Brestin

© UNESCO / F. Bandarin

Monuments


© UNESCO / F. Bandarin

Biosphere Reserves


© Meteliai Regional Park

Communication


© UNESCO / Daniça Bijeljac


© MB of Berezinsky BR

Monitoring System


© UNESCO / A. Stoškus

Guarding

© Flusslandschaft Elbe Brandenburg


© Mirko Pannach

© UNESCO / O. Brestin

Carrying Capacity

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© Giorgio Andrian

Natural Ressources

© UNESCO / O. Brestin

Conservation of Habitats

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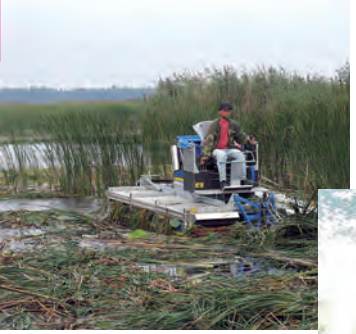
Monitoring



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Science and Research

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Time-lines

When in need to investigate a sequence of events, this can be done by using a linear rather than a radial chart. There are many ways to design such activities for learners to discover the succession within a chain process. For example, one way to practice organisation and decision making skills is to engage learners in drafting a management plan for a site: they are divided in groups and each group gets one step of the process. Each group should suggest the steps presenting and following theirs'. In plenary the steps are clarified.

Time lines in particular, can be useful when engaging in the concept of *Life Cycle* referring to products, processes and services. For any product, fresh (e.g. imported fruit found at the supermarket) or manufactured (e.g. a T-shirt, a bicycle, etc.) usually the following steps are followed: extraction and processing of raw materials; manufacturing; transportation, distribution; use. Following use there are options for re-use, recycle, or discharge and waste management. In all these steps there are certain environmental, social and economic impacts that may be addressed.

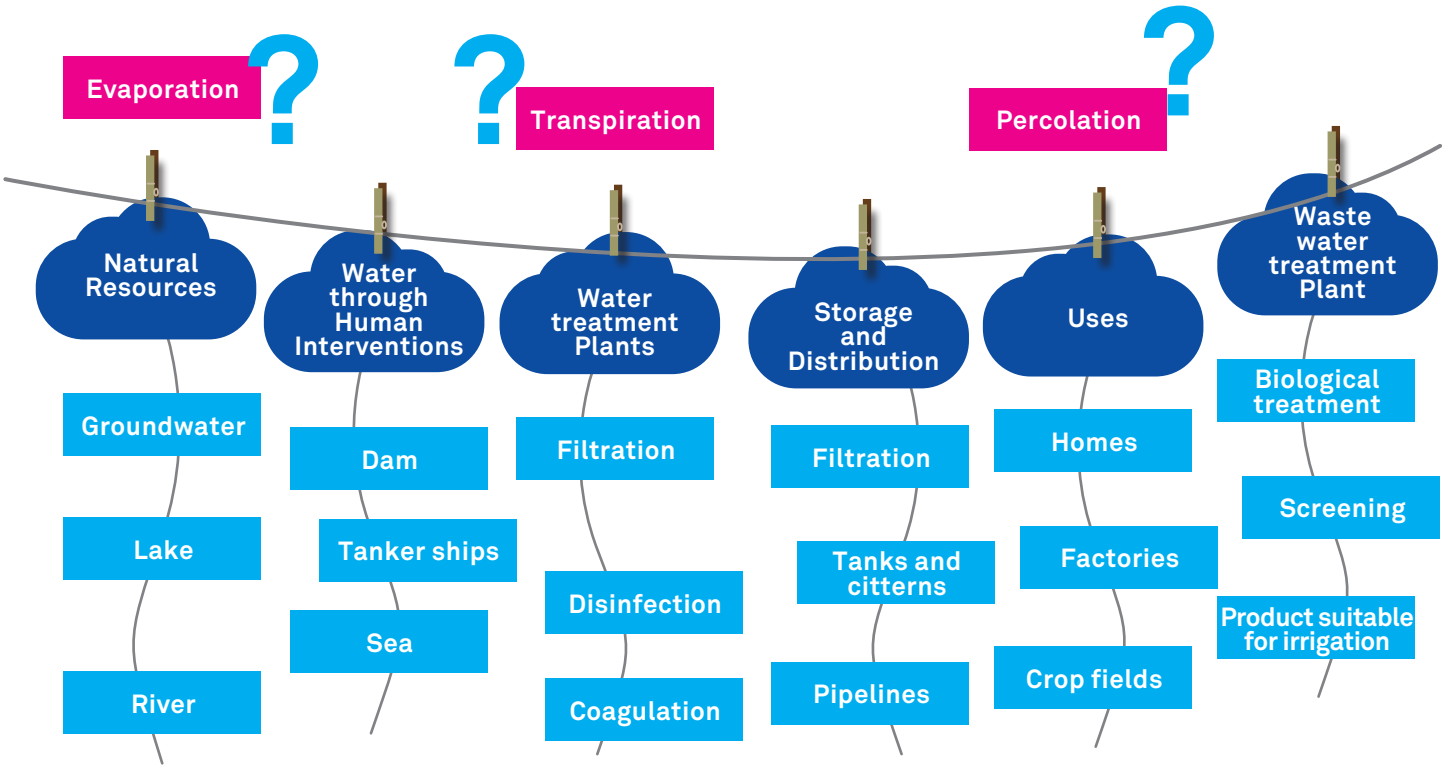


Chart 4
Learners may be asked to discover this schematic representation of "the journey of water to our tap"; the main time-line has 6 steps (clouds) each divided, or described by 3 concepts (tags)
Source: (**www.medies.net**)

8.5 Concept maps

Concept maps are used to investigate and highlight the relationships between concepts. They are based on the theory of constructivism according to which it is the learner himself who creates knowledge. The mapping process refers to abstract mental forms developed in order to "give shape" to a newly perceived concept (or object), to give meaning to it and to include it to one's existing conceptual framework. Concept maps constitute the graphic representations of such abstract forms. However, even before the formation of concepts and the creation of concept maps, the human mind firstly "shapes" a "scheme" by experiencing, conceiving and perceiving images of the visible world and the relationships among these, a process known as *perceptual mapping* (Novak & Gowin, 1984).

Concept mapping promotes meta-cognition, which is the understanding of the very nature and process of human learning. It familiarises learners with the very same "tools" of their own thinking process. In other words, they comprehend the way of their thinking, they learn how to learn, a fact that contributes in the essential learning, critical thinking and acting (Matsaggouras, 2003).

The mapping process is reflected in the "concept map", a schematic diagram which determines the relations between concepts related to a subject. In other words, a concept map constitutes an "impression" of the concepts conceived, processed and developed by the individual and at the same time, it facilitates the comprehension process, in a relatively short period of time.

Concept maps are used in ESD as a tool to explore learner's initial perceptions (pre-conceptions) and to present the results of qualitative research on interest and awareness of the environment (Vasilopoulou, 2001). Its implementation can be combined with other methods particularly at the onset of activities when learners are exploring ideas on a given subject. At the end of a programme it can be used for reflection and evaluation.

A simple way for an ESD educator to introduce the idea of concept mapping is to use the analogy of "islands - bridges": Concepts correspond to "islands" and the connector words correspond to "bridges". In Table 17, the basic stages of construction of a concept map are presented using the concept "ecosystems". The proposed approach can be adapted to the particular characteristics of any designated area or BR.

As in the case of web charts, participants may be asked to complete partially constructed maps for practice.

Beginners' maps may not be as satisfactory because they tend to connect most concepts using a linear sequence or they will group concepts to one side of the map. Generally, a satisfactory number of concepts in a map are between 7 and 10. Maps are also a useful tool to help identify learner misconceptions; this can be seen either through an inappropriate connection between concepts leading to a false statement or through a statement where the basic idea connecting two concepts is missing or through an illogical connection between concepts (Novak & Gowin, 1984).

Generally speaking, the positioning of concepts and the connections between them that lead to a logical statement, or in other words, connecting parts of the map using different groups of concepts, is what constitutes the criteria of successful map construction.

Comparing the maps of different groups allows participants see that common stimuli and objectives can produce differently shaped maps. Through the exchange of ideas, they may decide on a final, common map. Preparing presentations and discussing the maps helps teams cultivate meta-knowledge skills as well as the ability to process and use their own ideas; they announce them, they are conscience of them, they accept or reform them, they embrace or borrow ideas from others and they incorporate them in their own knowledge and semantic context.

26. Pine forest, *Peloponnisos*, Greece
© MB of Kotychi Strofylia / E. Tzovani

Chart 5
Concept map by educators highlighting the reasons for sustainable management in the Sounion National Park (Greece) after an ESD Seminar which was held there (June 2009)

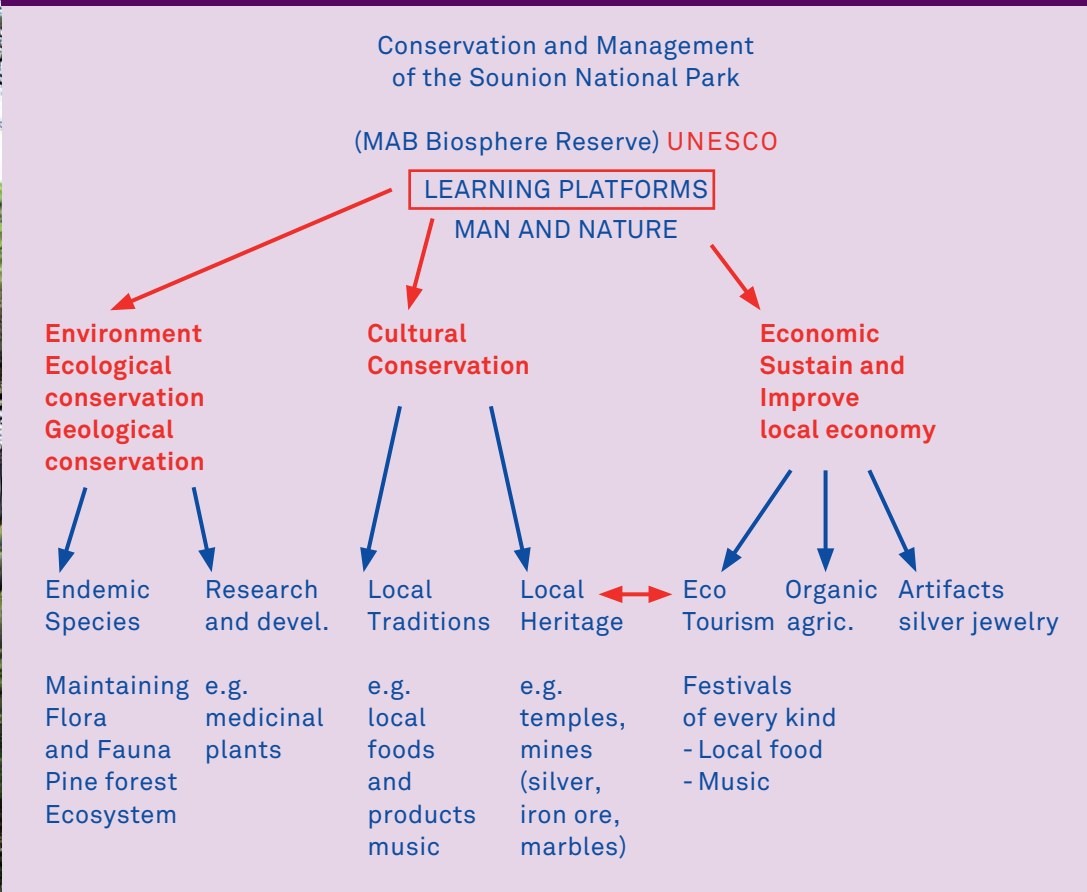


Table 18
Creating a concept map for the concept "ecosystems"

1. Defining basic and specific concepts The ESD educator may begin by presenting a brief text related to the issue to be studied, rich in concepts and meanings. He asks participants to read through the text and note key concepts for understanding. Concepts may have resulted from brainstorming sessions, e.g. from visual materials, photographs or a newspaper article. Alternatively, the educator may begin at stage 2, providing all the key words.	*Based on a text e.g. a newspaper article or photographs of an ecosystem or a BR, participants note related key concepts. For example: ecosystems, core zone, biotic and abiotic factors, habitats, species of flora and fauna, settlement, etc.*
2. From a general to a specific concept Using the concepts raised in the previous stage, the group with the educator rank them from the most general, or the central concept to the most specific. The latest are the words expressing specific concepts in comparison to that of the central concept. They place concepts on levels, beginning with the central concept noted on the first level.	*More specific concepts related to the general concept of "ecosystems" are: e.g. ground, plants, animals, insects, climate, management, fisheries, guides, agriculture, ecotourism, etc.*
3. Drawing the map and making connections To make logical statements, concepts recorded in the previous stage must be connected using connector-words. The direction of the arrow connecting concepts is very useful. It indicates the direction in which statements must be read and consequently, how the relationship between concepts was developed. Words above each connection should be as few as possible and should preferably be verbs.	*The concept map next page shows how a group of high school students placed concepts on levels, "ecosystems", "living organisms", "habitat", "plants", "animals", etc. and the connections between them.*
4. Making connections Participants try to look for interconnections – not only connections between concepts on successive levels, but between concepts on different parts of the map (diametrically)!	*It is useful to begin by looking for connections between specific pairs of concepts that are the most familiar to the group i.e. "the concepts plants and animals" and after that moving on to more difficult connections, i.e. "biotic and abiotic factors".*
5. Presenting and re-drawing the map Participants draw their maps in small groups and then present them to the entire group, presenting their arguments. After the discussion and reflection, they might need to change some parts or re-draw their map.	*Once the learners practice the concept "ecosystems" using a concept map with the educator, they can then proceed to draw maps for the concept "protected area or BR" in groups.*

It is noteworthy that the comparison of the groups' maps allows the learners to realize the fact that having a common start, stimuli and objectives they result in different maps. Through exchanging arguments they may reach to a final common concept map. The presentation and discussion process of the various maps develops meta-cognitive skills: the learners are processing and dealing with their ideas, they communicate them, accept or reform things, adopt or adapt ideas of others, including them in their own conceptual framework.

27. From the core area to the buffer zone, *Castillo de Monfragüe, Monfragüe BR,* Spain

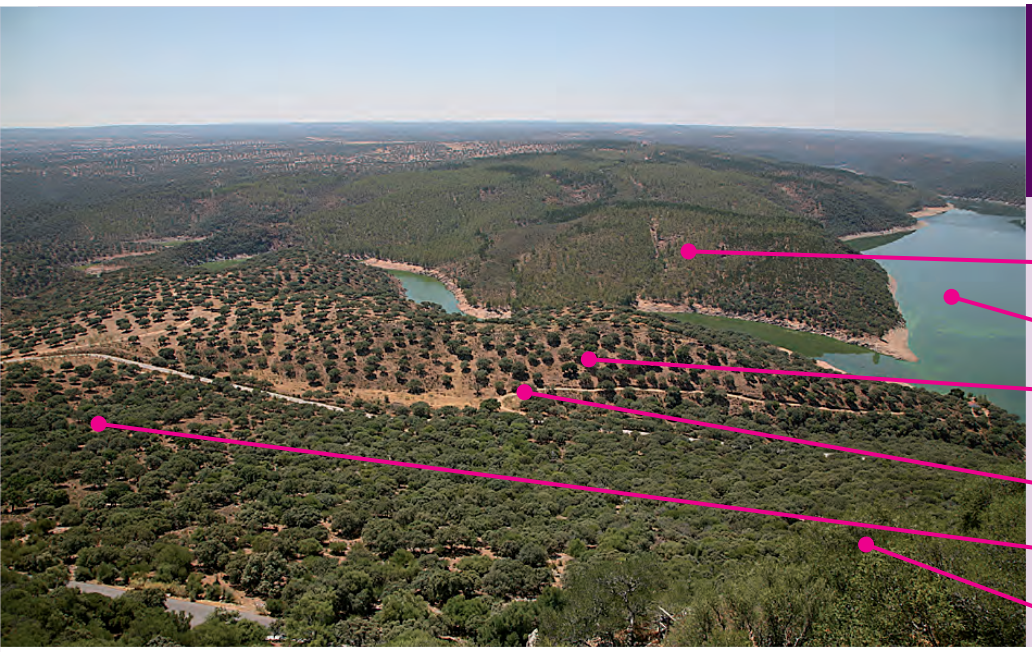
28. Holm oak dehesas, *Monfragüe BR*, Spain

29. Holm oak acorns, *Monfragüe BR*, Spain

30. Griffon vulture (*Gyps fulvus*), *Castillo de Monfragüe, Monfragüe BR*, Spain

31. Cicada, *Monfragüe BR*, Spain

32. *Arrocampo reservoir, Monfragüe BR*, Spain



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1 Defining basic and specific concepts

2 From a general to a specific concept

Ground

Plants

Animals

Management

Agriculture

Ecotourism


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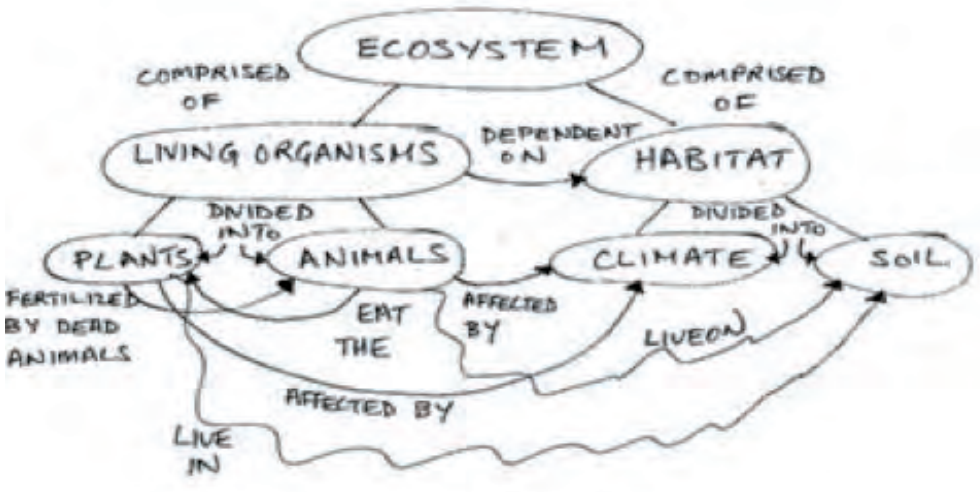
3 Drawing the map and making connections



Concept map by high school students on the subject "ecosystem"
(Vasilopoulou 2001)

33. Valve device for irrigation, *Arrocampo reservoir, Monfragüe BR*
©UNESCO/O. Brestin

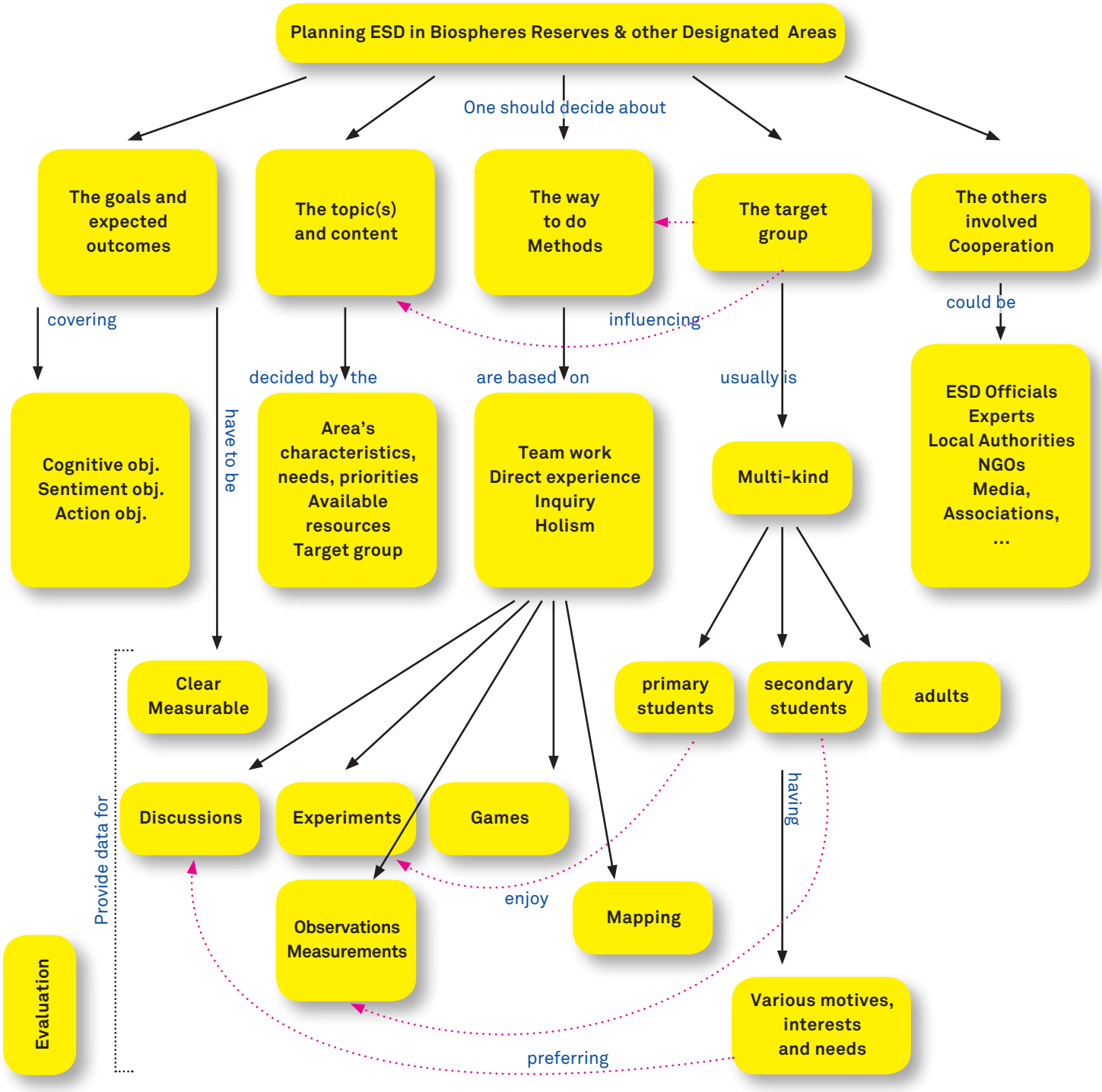
34. Fishermen by the lake, *Monfragüe BR*, Spain
©UNESCO/O. Brestin

35. Deer in the Biosphere Reserve, *Monfragüe BR*, Spain
©UNESCO/O. Brestin

36. Tobacco crops, *Monfragüe BR*, Spain
©UNESCO/O. Brestin

Discover the global connections using a ball of thread (adapted from Facing the Future, 2006)
Start with a brainstorm to identify today's issues of a global magnitude as viewed by learners. By the end they come up with a list of issues like i.e. overconsumption, climate change, poverty, human rights, peace, media, energy-control, refugees, etc.
The learners are split in small groups, each holding one global issue on a cardboard. One group starts by tugging a ball of tread to another group and then stating how the two issues are connected. (e.g. how in conditions of extreme poverty, children work to support their families, thereby being left illiterate; how conflict can be connected to discrimination, based on religious beliefs or ethnic backgrounds). The process is repeated by throwing the ball of thread from one group to another and by the end a web is formed, that shows how all issues are linked.
What happens in this exercise if someone (or everyone) starts to stretch the thread?
How can understanding the interconnections help us provide solutions to these problems?

Chart 6
Concept map that reflects the design of an ESD intervention in a MAB BR or a DA including the project's main guidelines (first level) followed by more specific elements (activities, materials, teaching tools, etc. on the second level)



8.6 Geographical maps, graphics and other visual tools

For adolescents who often use maps it is a challenge to interpret them, may they represent the ground plan of their school, a subway map, a road map or a weather map, etc. Although map skills (interpretation and drawing) mainly link to geography class, they also concern the overall curriculum and can be further developed in history, social studies, literature, mathematics classes and naturally in ESD by educators looking for new ways to enhance teaching and learning methods (Sobel, 1998; Grassos, 2005).

The complexity of maps depends obviously on the quantity and type of information they represent. Maps can be divided into two categories:
• **Topographic** (or general): maps that represent a region's natural environment (geomorphology) or human environment (political).
• **Thematic** (or specialized): maps that represent the distribution of certain features/characteristics in a region such as population density, language spoken, etc.

The ability to absorb information on maps seems to develop quite early. Findings show that children aged 3 to 4 years are capable of efficiently using large scale plans for a "treasure hunt"; to orient themselves in a maze or labyrinth; to recognize aerial photographs (Wiegang 1999; Harwood & Usher 1999; Bia, 2005). It is possible that children have the ability to perceive abstract concepts represented in maps by applying higher analysis and synthesis skills, contrary to Piaget's theory where these skills are anticipated to be developed at a later stage (Wiegang, 1999; Kamarinou, 2000). Of course, the ability to read (decode) a map is mastered earlier than the ability to draw one which demands higher skills of perspective, scale, etc. (Harwood & Usher, 1999).

For secondary education level, the successive levels of the cognitive process for decoding maps are as follows:
1. Reading which refers to the ability to recognize and identify information on a map. For example the students locate a BR, its zones and the human activities within it.
2. Analysing where:
a) Information of a map is grouped or classified. For example, given a map of population distribution around the BRs in the Mediterranean region, the learners try to identify similarities and differences in neighbouring countries.
b) Correlations on a map are made. For example learners relate touristic or industrial infrastructure of a region to the situation of near by wetlands.
3. Interpretation which refers to the opinions or predictions that are made based on the identified correlations. This process may require additional information or past knowledge. For example learners predict how the expansion of tourism facilities or a road axis would affect a BR.

Many adolescents find it difficult to make correlations (step 2b). Therefore educators should make sure that students perform well in the prerequisite skills of reading (step 1) and classifying (step 2a). With practice, even students in the early grades of high school can master relatively complex decoding skills (Van der Schee & van Dijk, 1999). Chart drawing is the most demanding task, as it requires well-developed abstractive and synthetic skills. Commonly reported difficulties concern concepts such as ground plan, open space, perspective, scale, land planning, etc. (Harwood & Usher, 1999; Kamarinou, 2000).

Certainly, the form a map takes depends primarily on its subject and scope. Its final form is a combination of personal intellectual spatial view (*assimilation* according to Piaget) with the *accommodation* of new information. Students seem to find more interest in the interpretation rather than in the detailed illustration of an area (Kamarinou, 2000).

The degree to which an ESD programme in a BR expands to reading and drawing maps depends on its objectives – particularly when these refer to visual-spatial intelligence (see Gardner's theory parag. 5.3); the level of the learner's interest; and on the complementarity to other methods applied in the programme. Topographic maps can be used in different ways, i.e. in activities using a ground plan of a wetland, orientation maps for a "treasure hunt" on a beach, a map of a forest path... Thematic maps are useful particularly for the study of geographic distribution issues, i.e. the distribution of a migrating bird along a cross-border river and its correlation with the nearby human settlements... A map, appropriately altered, can even be used as an evaluation tool in a programme.

37. Map presentation on *World Animal Day*, *Meteliai Regional Park*, Lithuania
© Meteliai Regional Park

Table 19
Suggested activities using maps in a MAB BR or a DA

Food miles: ideas to practice in map reading
A brainstorm is held on learners' favourite fruits. Both local and exotic fruits will be probably mentioned. The ESD educator notes a couple of contradicting examples of fruit grown locally (e.g. oranges for northern Mediterranean shores, compared to bananas imported from the Caribbean, or elsewhere).
A world atlas or outline map is used for learners to i) trace their country on the map; ii) trace the country of origin of the exotic fruit and mark the round trip of ships. Older students can use the map's scale to calculate the distance and the time required for a ship to transport the fruit to their country.
A discussion follows on the concept of "food miles" in terms of time and energy required and how this correlates with its price, availability throughout the year, etc. One step further, they may research to find out how much of the profit of a kg of fruits goes to the producer, and give ideas on how to be more responsible when buying fresh products.

Figure 22
Choosing seasonal and locally grown food

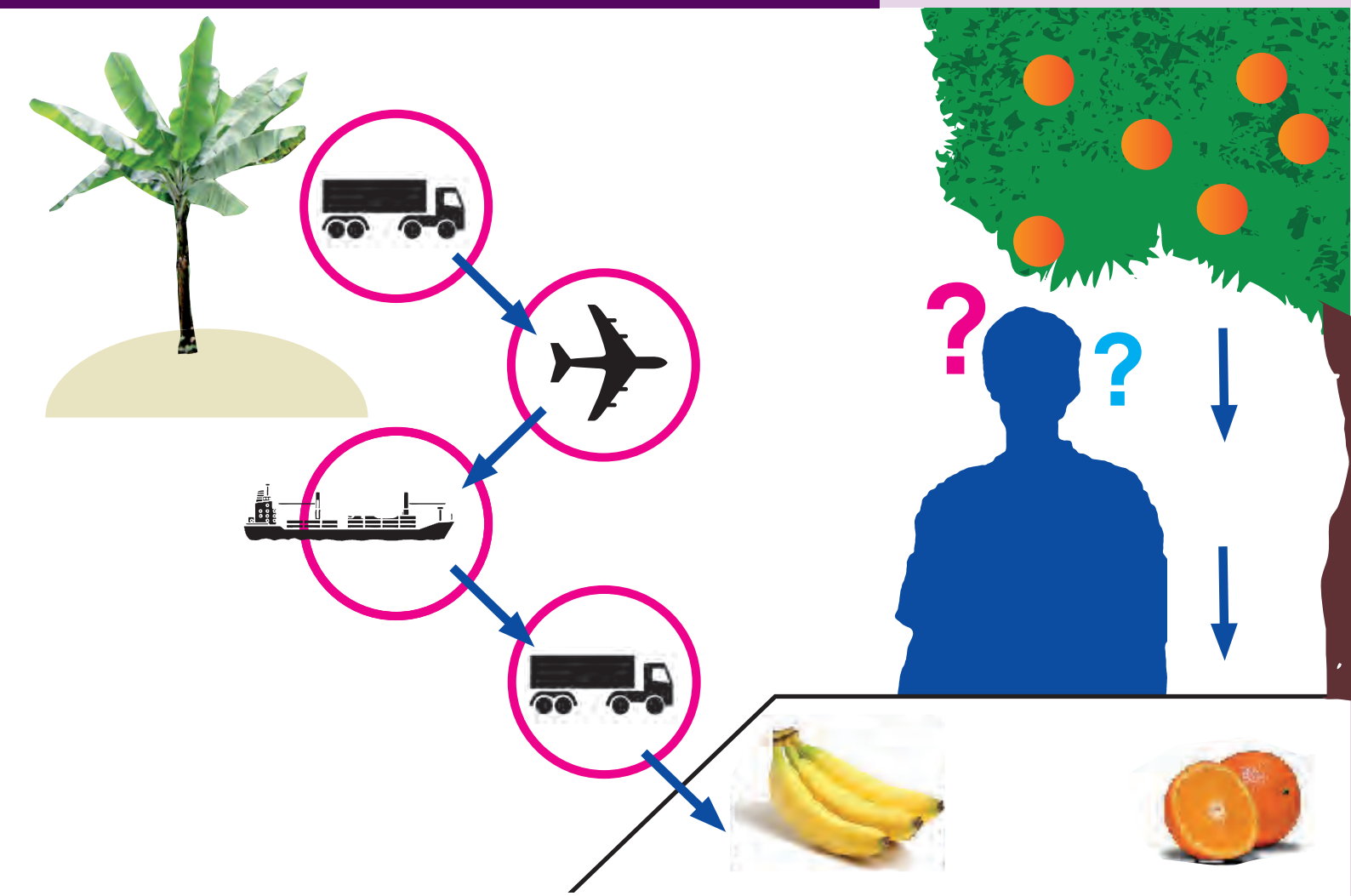


Table 20
Growing season calendar for oranges in the Mediterranean basin

● Peak season ● Mid season ○ Out of season

Fruit	Month											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Orange	●	●	●	●	●	○	○	○	●	●	●	●

Free drawings of charts
Learners are asked to make a map by taking a walk in a forest area, without looking at what the others are drawing. They are instructed to include any element they discover during their walk that they feel important to inform their schoolmates about.
The resulting maps reflect learners' personalities as they focus on different aspects of the surroundings such as biodiversity, tourism services, other human interventions aesthetics, etc., proving to them how subjective the perception of space can be. It is possible for these maps to be used as an introduction or to serve as an informal evaluation tool in any ESD programme in a BR. At a later stage, (e.g. after returning to the classroom) map making skills can be addressed in a more systematic manner by asking students to add elements and symbols that will make their maps readable to visitors (like orientation aids, hiking symbols, street names, etc.).

Toponyms or place names
Toponyms or place names can tell interesting stories: in a given area they may provide information, for example, on its type of soil or its prevailing climatic conditions (e.g. Rocky Hills), its waters or wells (e.g. Wet Mountain, Tunbridge Wells Village), the existing vegetation or cultivation (e.g. Maple Hill, Rose, Vine Gardens), its residents' vocations (e.g. Shepherd), etc. In cases of past conquerors of different civilisations the names in other-than-native language might be preserved (e.g. Mount Beles in Greece, which means white in Bulgarian), while names that have survived since antiquity reveal information on the area from thousands of years ago.
Starting with a geophysical map, learners are asked to make connections between place names and the physical environment. They can confirm their hypothesis by looking up the bibliography or interviewing the residents, especially the elderly.
By comparing modern maps with surviving prints or gravures of the past, students are able to see how an area's ecosystem has evolved or how the settlements' names may have changed from the past or conquerors.

Multiple maps
Working in groups, learners are asked to make various thematic maps using transparencies (based on a common template), so that by placing one on top of the other correlations can be made. For example, a map looking at an area's water supply would be comprised of successive layers of transparencies that show, respectively:
- Natural sources of water (rivers, lakes, streams);
- Natural water catchment area (watershed);
- Proposed plans for irrigation canals and points of their water supply;
- Settlements (farms, villages, etc.) of the present, the recent past and in antiquity;
- Existing infrastructure (roads, railroads, electrical power lines, waste disposal systems, sewage dumps or landfills);
- Characterization of the region (e.g. Natura 2000), and land use (e.g. forest, wetlands, grazing areas, and cropland).

Orientation activity
Read more at (**www.greenthink.it**)
Orienteering is a very popular sport in Scandinavian countries. It is based on covering a settled trail with some control point with the only help of a compass and a topographical map. Best place to do the activity is the woods, but other possible sites are urban parks, historical city centres etc. It can be done on foot but even with snowshoes, skis, etc.
Orienteering activities with different levels of difficulty are suitable for both young learners and adults. Kids, learn how to use a map and compass and to interpret what is around them; adults test themselves and train in the skill of orientation.
The steps are the following:
- Preparation activity: the ESD educator presents the activities, explains topography, the concept of scale and symbols, how to draw a map (e.g. of their school). Digital device and multimedia can keep attention.
- In the field: learners in small groups are given a compass and a topographical map, with the objects to find. A briefing of the rules of the game (safety, time, respect, team work) is done in plenary. The orienteering activity can have the form of competition between groups or as a trained activity led by the educator. Groups move around looking for the objects, while the educator stays at the "base" just to answer clarification questions.
- Debrief: by the end, groups reflect on the way they conducted the team work, compare results and discuss the pros and cons of the activity.

Developing media literacy

Societies today often live in a media rich environment, and especially youth experience an unprecedented flood of images and data from many sources, including the internet, television, radio, magazines, films, billboards, etc. How do these media work? How are they organised and how do they construct reality?

Media literacy helps people develop a critical understanding of the mass media, the techniques used by media professionals, and their impact. A media-literate person is in position to react to the influence media exerts to their behaviours and desires and make informed decisions as citizen, consumer, etc. In this sense developing media literacy should be a priority for the ESD educator.

Media literacy refers to viewing or reading any media message (including 'hidden' promotional messages) critically. The characteristics of the media messages are the following:

- Media messages come in different formats (i.e. commercials, news articles, billboards).
- All media messages are constructions created for a specific purpose and target group(s).
- They way media messages are constructed includes words, images, sounds, videos.
- People interpret media messages differently, based on their experiences and even prejudices.
- Each media message represents someone's social reality: just because something is printed and is real does not make it true.

Table 21
Suggested activity for analysis of an advertisement adapted from (www.youthxchange.com)

1. Introduce the subject of the role of advertisements in plenary asking the following questions.	- Are you attracted by advertising messages and why (i.e. cool images, claims, testimonials, brand confidence)? - Do you feel able to fully understand an advertisement message? - Do you feel overpowered by advertising? Do you feel manipulated? - Do you think advertising stereotypes can affect social behaviours? - When an advertisement message can be useful to the community? - Do you think advertising can raise awareness also on social/environmental issues? - Does an "Advertising Code of Conduct" exist?
2. Use printed advertisements, or watch video commercials that target youth (e.g. of food & drinks, cars, mobiles, laptops, etc.). Try to include categories of products with advertising which privileges the emotional aspects; and other categories for which advertising privileges rational aspects. These questions can be addressed.	- Is the main purpose of the advertisement to inform or to entertain? - Who is this message intended for? - Who wants to reach this audience, and why? - From whose perspective is this story told? - Which voices are heard and which are totally absent? - What kind of strategies does this message use to get your attention and make you feeling 'included'? - What is the "communication path" of the advertisement? (brand, target, strategies, goals, etc.).
3. By the end, it is important for ESD educator to debrief and at the same time direct the group to suggest an alternative, a "way out" a critical reflection to the advertisements influence. The following questions may be of use.	- How do I (we) respond to this advertisement over blowing? - Should I boycott the product? - Should we write a letter to the company, asking questions on their claims? - Should we discuss it with family and friends, etc.

Figure 23
Discover the global village
Excerpted from youthXchange - training kit on responsible consumption - the guide (inside page)

Discover the global village

"Let the villages of the future live in our imagination, so that we might one day, come to live in them."

[Mahatma Gandhi]

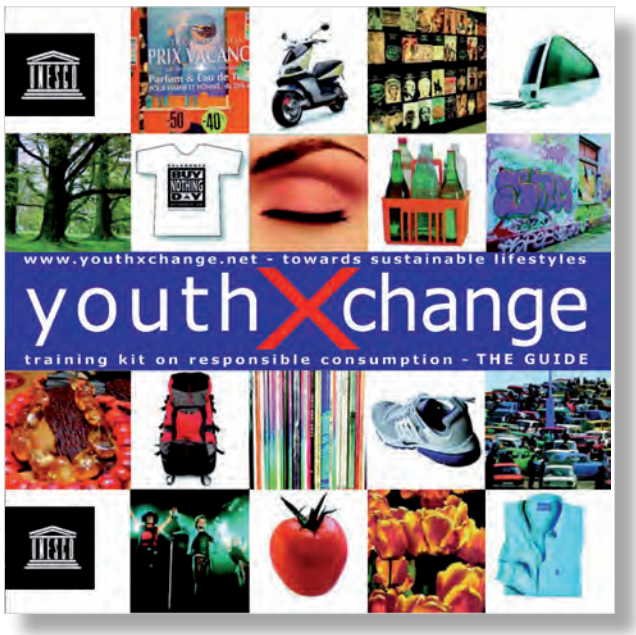
Young people today often live in a media-rich environment, experiencing an **unprecedented flood** of images and data from many different sources. They are inundated with information on politics and current affairs, music, science, the 'hottest' new celebrities, fashion, and a myriad of other topics and issues.

Children are growing up in a culture where most of their **information** and **entertainment** comes from the media: newspapers, radio, magazines, film, the Internet, or television.

How do these media work? How are they organised, and how do they construct reality? Media literacy helps people develop a **critical understanding** of the mass media, the techniques used by media professionals, and their impact. In other words, it enables young people to make their own informed decisions.

Moreover, **media literacy** can help prepare young people to react to the influence media exerts on their values, consumption patterns and desires. It also teaches them how to 'use' the media to 'make a noise' and promote their own values and a more sustainable lifestyle - in other words - their **rights** as citizens and consumers.

Cover *YouthXchange: towards sustainable lifestyles, training kit on responsible consumption*



Front page, *The Guide to YouthXchange*,

8.7 Learning through objects

The importance of learning through objects has been well-documented in the field of educational psychology. For instance, Piaget and Bruner's positions, as well as the theory of constructivism, emphasize the value of learning through direct experience, natural contact and interacting with objects. This approach allows the learner, through his senses, to make a direct connection to the object which ultimately leads to increased interest. In this way, an ESD educator can attract the attention of all learners, in particular those who do not respond well to written texts. The method is recommended especially for young ages of learners.

Whether familiar or unknown and mysterious, objects can stimulate the senses, create a visual memory, produce cognitive symbols and help to understand abstract concepts. For example, a clay water pot can generate many discussions including its origin, its value as a household utensil or as a family heirloom, how it came into the family (e.g. by dowry or inheritance), the social position of its past owners (if the owner's or the potter's name is stamped on it)...

Objects also serve as a vehicle of ideas and messages that language may not be able to express as well. There are numerous connections hidden in and among objects: ecological, biological, historical, chemical, archaeological, geological, etc. Certainly, in the context of an educational programme, the meaning given to objects depends on the maturity and knowledge of the ESD educator as well as his social and cultural influences.

The **advantages** of learning through objects are the following:
- Through hands-on experience all types of educational objectives (cognitive, psychomotor and affective) are equally addressed.
- Learning though objects has by nature an inquiry exploratory character.
- It is holistic and interdisciplinary: studying objects (e.g. an old fishing or agricultural tool, a household utensil, etc.) can help generate questions, uncover information relating to cultural, historical, technological, social and value aspects; that is filtered through a learner's personal experience.
- It eradicates the barrier of language which is not so much used in this method. This is especially useful in todays' multicultural classrooms where some children may face difficulties in language taught or in cases where the learners have disabilities.
- It develops social skills particularly in terms of intergeneration communication. Often an older family member is asked about the use of an old tool or appliance, such as a coffee mill or a loom, which may seem puzzling to someone younger.

The steps of interpretation in learning through objects are the following:

a. Observation / Description: On first contact with the object, learners assemble information by looking, touching, hearing, smelling – and perhaps even tasting it. Recognizing an object's raw materials is an important part in this process. For example, asking the question "Are the materials natural or man-made?" may open up a discussion on how people (cultures) are related to their natural environment. At this stage the object's use, the time and method of its construction, its design and packaging, its life span, the possibilities of re-using or recycling it etc. can also be researched. Of particular value are objects that have been made within the BR, or have otherwise been introduced for specific uses.

b. Analysis (and Classification): The ability to compare and contrast is a key skill in this stage. The quality and detail of comparative analysis corresponds to the learners' level and experience. Important critical thinking skills are developed through examining the classification itself as learners are given the opportunity to evaluate different classification methods. For example, by examining pottery from an area, learners can classify them according to shape, color, weight (density), texture (smooth or rough), decoration and then move on to more complex taxonomies using criteria such as the object's raw material, construction method, possible use in the home, its availability in the area and its trade... In this way, learners can weigh the classification factors and then gradually define their own criteria according to their project's objectives.

c. Interpretation: Most objects have both a concrete and a symbolic aspect, "carrying" many more messages than a simple observation provides (step a). Interpretation of an object considers the context in which it is found, in other words, its natural, cultural and social setting. By stimulating learners' curiosity in an object, (e.g. an aluminium can which is thrown in the field), discovering such connections is in itself an enriching activity. The appropriate questions (what, who, where, when,

38. Roman vestiges of *Tipaza*, Algeria, © Olivier Brestin

39. Pieces of pottery, *Blida*, Algeria © Olivier Brestin

40. *Sousse* fishing port, Tunisia © Olivier Brestin

41. Borie (dry-stone shelter), *Luberon-Lure BR*, France © UNESCO / Olivier Brestin

42. Bird observatory, *El Acebuche, Doñana BR* © UNESCO / Olivier Brestin

43. Pomegranates, Tunisia © Olivier Brestin

44. Grasshopper (*Ephippiger terrestris*), *Sierra Nevada BR, Spain* © UNESCO / Olivier Brestin

45. Varied range of goat cheeses, cheese dairy, *Luberon-Lure BR*, France © UNESCO / Olivier Brestin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Smell it!

Sweets

Cooking

Essential oil

46. Mint (*Mentha longifolia*), *Juviles* region, *Sierra Nevada BR*, Spain
© UNESCO / O. Brestin

47. Samphire (*Crithmum maritimum*), *Cala Mesquida, Menorca BR*, Spain
© UNESCO / O. Brestin

48. Atlas cedar (*Cedrus atlantica*), *Montseny BR*, Spain
©UNESCO/ Olivier Brestin

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The "touch pool"

Thick

Fleshy

Prickly

49. Thistle blossoms at different stages, *Santa Fe del Montseny, Montseny BR*, Spain
© UNESCO / O. Brestin

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how and most importantly, why) are keys to decoding the "messages" of objects. Given that most learners lack experience in these types of questions, from a pedagogical point of view, the ESD educator's role is especially important and decisive in the development of meta-cognition. In the previous example, interpretation questions for the can, may include: "Why was it made of this material?", "Why was it thrown away in this manner?", "When will it decompose once buried?", "What are the dietary habits of the person who threw it away?", "How could its presence be discouraged in this area?", "What was in its place 100 years ago?"... Obviously the answers to these questions may never be conclusive: people interpret objects differently, depending on their perceptions and varying background. This is a good opportunity for them to present and support their views, develop active listening skills and cultivate mutual respect.

In any case, the educator must always keep in mind that in ESD "objects" and "circumstances" are simply the vehicles and stimuli transmitting the important messages intended for the learners to receive. In the previous example this may refer to visitors' deportment in nature, consumption habits, natural resources depletion, etc.

During evaluation of the educational intervention, the designer and the educator should bear in mind that "learning to read" objects and to accumulate the newly acquired experience to existing knowledge requires ample time. An added value of the method lies in an individual's shift in perception and analysis skills in the long run. This is difficult to determine with any accuracy during the intervention itself.

Table 22
Possible activities using objects for an ESD programme in a BR

Game	Skill development
Smell it!	**...description and interpretation**
Following a field visit, various aromatic plants are placed in separate bags. Players try to guess what is in each bag simply by smelling it. They may also be asked to give a word or metaphor for the plant as they smell it.	
The "touch pool"	**...description**
Various objects of different material, texture and shape are placed in the same bag. Players are asked to formulate hypotheses on their raw material (organic or inorganic), origin, etc.	
Draw the object	**...description**
Players sit in pairs, back to back. Player A decides and describes in detail an object found in the field while Player B tries to draw it without knowing what it is.	
Guess the object	**...observation and analysis**
A player thinks of an unusual object related to the BR. The remaining players try to guess what the object is by asking 10 questions whose answer can be either "yes" or "no" (the number of questions may vary, depending on the object). Players draw conclusions on the importance of classification and the sequence of questions.	
Possibilities of an object	**...analysis**
Players are asked to give as many different possible uses of an object, e.g. a headscarf, a paper clip, etc. They are then asked to name other objects that can be used for the same purposes.	
30 questions about an object	**...observation**
Players are shown an object found in the field (e.g. a piece of fishing net or a hoe) and asked to propose 30 questions about the object. This activity shows learners how much information can be gathered from a simple everyday or "insignificant" object, depending on how they look at it.	
The tangle	**...observation**
Using a series of photographs of objects found in the field, players secretly choose one and describe it in one paragraph. One by one, the paragraphs are read aloud and the remaining students try to guess which object is being described.	
The museum	**...classification**
Individually or in groups, players are asked to classify several objects discovered in the field as if they were to be displayed in a museum or an exhibition hall. Naturally, for every classification they must explain their criteria (use, materials, size, etc.).	
Make up a story to connect objects	**...interpretation**
Seemingly unrelated objects (no more than 7) found in the field are pulled from a bag and players are asked to make up a story connecting them. Who may have owned this? For what reason? When? What happened after? And so on.	
The time capsule	**...interpretation**
A "time capsule" is a container in which modern objects are placed and then buried for people to uncover 100 years from now. Students negotiate the criteria and select which objects are to be buried to provide future generations certain intended messages. The activity needs to have a theme that may be general (e.g. our ways of communication) or specific to the BR (e.g. objects related to our beach, lake etc.).	

The ecologist's collection
Based on the learners' discoveries during a field visit in a natural area, they create a collection of characteristic biotic and abiotic objects
(adapted from UNESCO's Teaching Resource Kit for Dryland Countries, 2008).

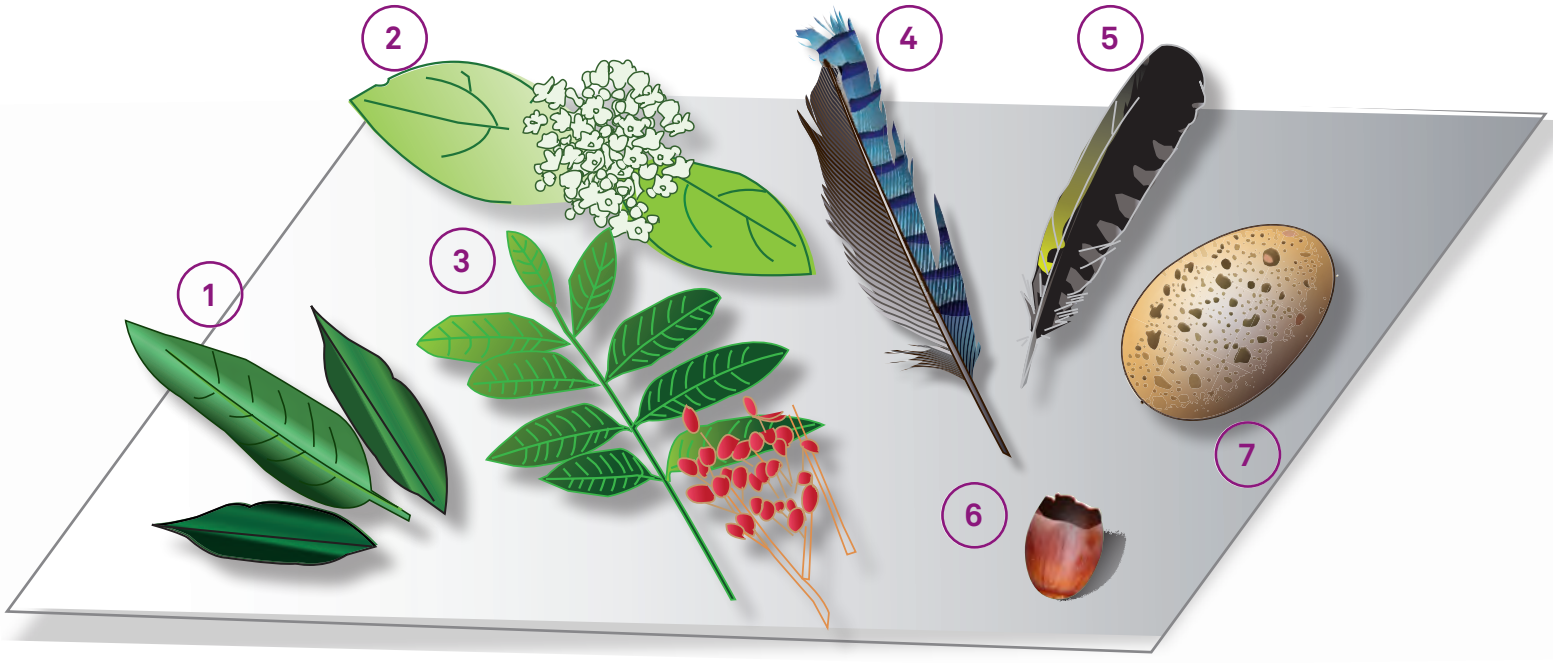
- After an introduction from the ESD educator on ecology concepts like species, kingdom, biocenosis, biotope, food chain, habitat, etc. learners are asked to collect characteristic objects from the field.
- One by one the learners place the objects in a box, justifying their choice using the concepts discussed before. The collection should represent the unity and diversity of a given habitat in the landscape.
- Educator's role is to shape the collection according to the reality of the environment.
He/she may bring qualitative elements into discussion such as species richness, or variety, species decline due to human activities etc. After the discussion learners may want to go for a 2nd round to enrich the collection.
- Back in class, the learners paint the box using colours of the soil and vegetation of the landscape. They may glue mineral samples, sprinkle sand onto a layer of glue, etc. to create an effect that resembles reality.
- Within a school year a couple of similar boxes may be prepared and compared each representing a specific type of ecosystem (e.g. wetland, marine, forest...).

⚠ A clear instruction should be given to learners from the beginning not to remove any alive plant or animal organisms but collect only those in decay (e.g. fallen leaves, dead insects, bird feathers, snake skins, cones, shell fragments, half eaten fruit, etc.). When it is not possible to remove something (e.g. footprints, animal extracts, a nest, an alive lizard or bird, etc.) they should just take photos of it.

⚠ To implement this activity successfully the educator must be experienced in tracking.

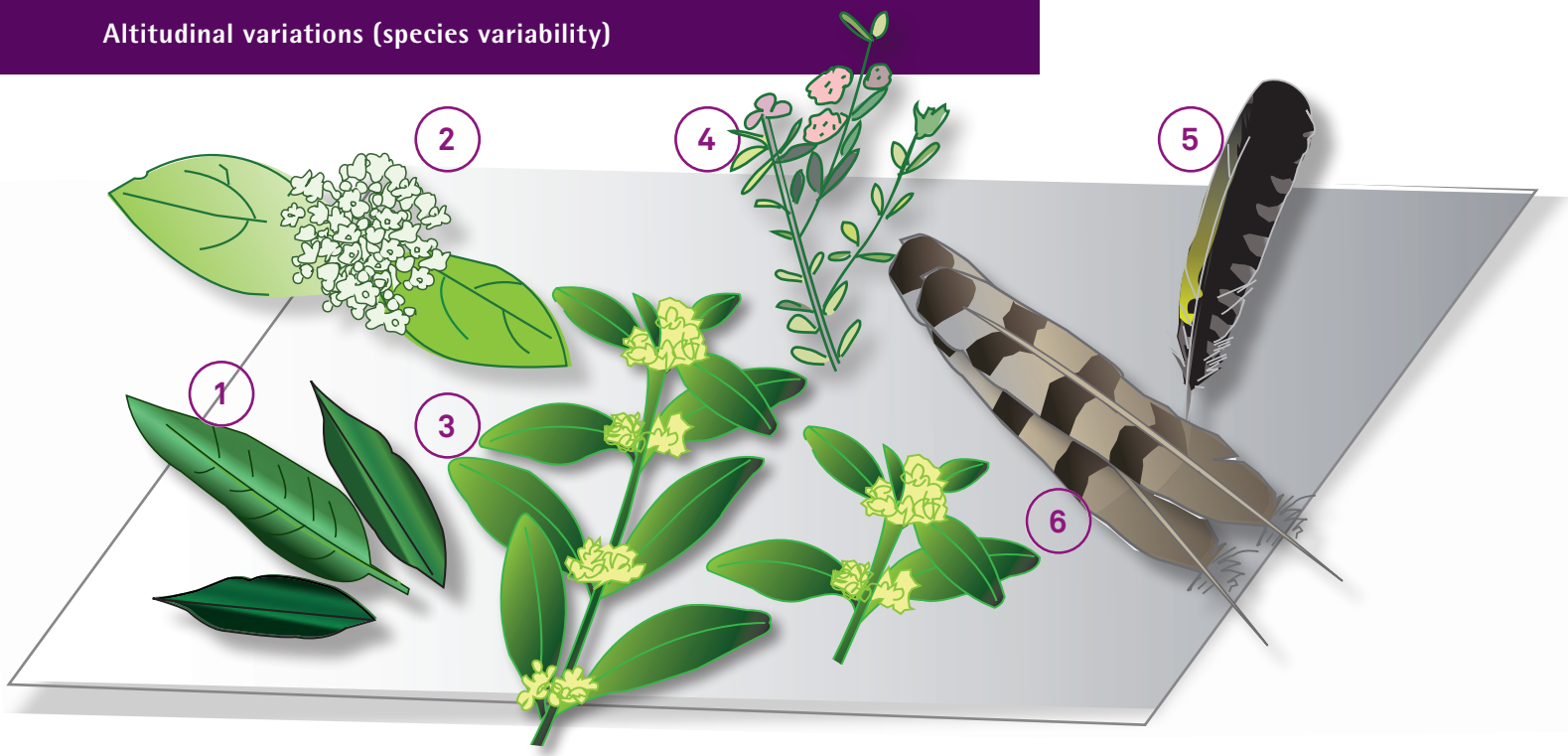
As a follow up to this activity, especially in case of students, they may make individual research on a particular species of the ecosystem.

Figure 24
Evergreen forest dominated by holm oak (*Quercus ilex*) **on calcareous soil**



1. **Holm oak** *(Quercus ilex)*
2. **Laurustinus** *(Viburnum tinus)*
3. **Turpentine tree** *(Pistacia terebinthus)*
4. **Eurasian jay** *(Garrulus glandarius)*
5. **Green woodpecker** *(Picus viridis)*
6. **Half eaten acorn by dormouse** *(Muscardinus avellanarius)*
7. **Sparrowhawk** *(Accipiter nisus)*

Altitudinal variations (species variability)



1. **Holm oak** *(Quercus ilex)*
2. **Laurustinus** *(Viburnum tinus)*
3. **Boxwood** *(Buxus sempervirens)*
4. **Thyme** *(Thymus vulgaris)*
5. **Green woodpecker** *(Picus viridis)*
6. **Northern goshawk** *(Accipiter gentilis)*

8.8 Experiments

An experiment is an activity that is conducted under controlled conditions to test a hypothesis, to confirm a law, to discover an unknown result or to induce a change to one or more system variables caused by internal or external factors. Conditions are controlled, in the sense that researchers having identified all relevant variables, keep all but one (the one tested) unchanged.

The experimental method is mostly applied in Natural Sciences laboratories, but not only. The method can be applied to the Social and Economic Sciences as well. In general, the experimental method in ESD includes the following steps: *Making hypothesis – Conducting activity - Data processing - Testing initial hypothesis – Making conclusions and correlations.* In the last stage ESD educators should make colorations to the social and economic factors related to the issue being studied and to clarify the relative values (Giolitto, 1997; Hungerford, 1994).

It is also important for the study to be relevant to the participants' interests and to the life of the local community. A good start for an ESD experiment in a BR is the examination of the environmental and the social parameters of the BR by the group. With the help of experts, wherever needed, they can identify the critical issues for the area and then form their hypothesis. The group can then experiment with certain parameters in the lab or in the field, draw conclusions and in combination with other activities they may come up with proposals.

Field experiments are important tools for studying environmental issues and understanding certain key concepts. They contribute to those skills related to critical thinking and testing hypotheses including observation, documentation, classification, comparison and measuring and data evaluation. They also play a role in the development of psycho-motor skills such as setting up apparatus, using instruments, etc.

During experiments, learners can work individually or in small groups of e.g. four members. When all groups test the same variable at the same time, they control the activity's *reliability* of their activity. In any case, learners should keep record of their activities and results and reach at some conclusion. If possible, they may also propose changes to improve the experimental process (Alampei & Scoullos, 2007).

The educator should "test" the experiment himself prior to the students for organisational and safety reasons as well as for checking its effectiveness, and pedagogical appropriateness. During the preparation and when conducting experiments, an educator needs to pay particular attention to the following points (Ross, 2002):

- Clearly set safety regulations in the laboratory and in the field.
- Encourage participation by assigning responsibilities to all.
- Prepare worksheets for the experiment in advance.
- Ensure ample time to comment on the results and give feedback.
- Suggest additional tasks after the experiment (research reference material, etc.) upon returning to the classroom.

An experiment may be conducted based on the constructivism theory, according to which: "the educators begin with what learners already know and knowledge is built by the learners through their experiences and interaction with the others and the environment (natural and social)". Experiments conducted by a constructivism approach include the following basic steps: (a) Orientation, (b) tracing learner's ideas (c) restructuring ideas (d) applying ideas and (e) reviewing ideas (Driver et al., 1998). The last two steps may change order accordingly.

Table 23
Suggested experiment for water quality control in a wetland (lake, river, etc.) using the constructivism approach (applicable also in the field)

Step/phase	Example for application
(a) Orientation phase It aims to spark off the learners' interest. This can be done by making questions, a slide presentation, etc. The ESD educator presents the experiment's materials and equipment and explains the procedure to be followed, trying to make learners feel "safe" enough to proceed with the experiment.	The ESD educator may start with questions like "Why is it important to test the water quality of the wetland?", "How biodiversity, aesthetics and inhabitants of a region are affected by water quality?", "Which parameters should be measured to test it?", etc. The educator makes a synthesis of the responses and explains the basic measurements for water quality testing: temperature, odour and colour, turbidity (Physical parameters); pH, dissolved oxygen, nitrogen, phosphorus (Chemical parameters); bio-indicators, etc. (Biological parameters).
(b) Elicitation of ideas Learners are encouraged to express their ideas related to the studied subject, orally (in dialogue sessions or in groups) or in writing (filling in a worksheet). They may be asked to formulate the hypothesis, where they are called to predict the results of certain experiments. Their opinions are recorded and classified by the ESD educator.	A team observes an area including the cleanliness of the riverbanks, the water's colour and odour, any human activities near the wetland (industry, agricultural facilities, settlements) etc. Possible questions from the educator may include: "What do you suppose about the quality of the water?", "From where do you think the pollution is coming?", "What results do you expect from the experiment?". The educator records the team's answers and presents them along with the worksheets (see Annex).
(c) Restructuring of ideas The learners are called to test their ideas and hypothesis, by conducting the experiment. If their results coincide with their hypothesis, the existing knowledge is verified. If that doesn't happen a cognitive conflict arises, as their prior knowledge does not satisfactory explain the results. Learners will need to adjust or shift their initial ideas to explain the results (conceptual change) thus approach the scientific model. It is important to involve the learners as much as possible to the experiment's planning process, in the discussion of what should be studied and what variables are implicated...	In small groups, learners conduct the experiment on quality control of the water. The educator encourages them to select the instruments they will use, to take samples, to take measurements, to record their data, to document their observations on the worksheets, which they will have to comment on later. The educator poses questions such as: "What was your initial hypothesis about water quality?" "What have you found?"
(d) Reviewing phase Teams present their conclusions before the entire group. They test to see whether their initial hypothesis was confirmed and they compare their newly found ideas after completing the experiment. This process is a means enhancing the meta-cognition.	In this phase, teams discuss the process, comment on any difficulties they faced and discuss and analyze any other observations. They then combine their findings. Educators and learners discuss how they designed the process, if it was repeated based on their observations, on their results, on any difficulties they faced...
(e) Application phase In this phase (that can precede phase d), learners correlate the experiment to their everyday life. They should be provided with the opportunity to ascertain that the experience and knowledge gained can be applied in real world situations for the resolution of problems. This phase is very important because learning through conceptual change is considered to be completed only when the adoption of new concepts can be applied within a new framework.	The group is asked to draw conclusions on the state of the wetland based on its findings. They are also requested to classify the causes for this situation e.g. increased levels of nitrogen and phosphorus indicate possible agricultural or urban waste runoffs. At the end of this phase, the team can move on to activities for resolving the problems it identified earlier (e.g. a clean-up campaign or an awareness programme for local residents or authorities...).

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50. Student in laboratory, ©UNESCO-IHE

51-52. Students on fieldtrip, *Limburg*, Netherlands ©UNESCO-IHE

53. Fingerponds project, Uganda, East Africa ©UNESCO-IHE

54. Common carps, *Méjane* region, *Camargue BR*, France ©UNESCO / O. Brestin

8.9 Analogies and models

Analogies

The importance of analogy in the learning process is particularly emphasized in contemporary teaching resources (i.e. Rumelhart & Norman, 1981). In practice, the use of analogy is quite common. Whether done intentionally or unintentionally, a teacher uses analogies every time he uses phrases such as "It is exactly like...", "Let's think about it like..." etc. An effective analogy helps learners activate, transfer and apply existing knowledge into a new context. In this sense, it is not only a useful but often necessary part of an educational intervention. However a deficient analogy makes no sense to the learner or, worse it can cause confusion and misunderstanding (AAAS, 1990; Glynn, 1994; Kokkotas, 2002; Scoullos and Malotidi, 2004).

Every analogy is based on finding similarities between two seemingly unrelated concepts or systems. Ideas are transmitted from a familiar concept (*analog*) to an unfamiliar one (*target*): the more connections made (features), the more successful the analogy. Many examples are derived from the natural sciences, such as Rutherford's atom compared to the planetary system; or the analogy of key-keyhole explaining the enzyme's role as a catalyst in reactions; the analogy of the heart's functioning to that of a pump; the eye compared to a camera lens, electricity compared to hydraulic circuits etc. In the field of ESD, a well-known analogy is the "spaceship-Earth" analogy used in the 70's to explain the planet's finite natural resources.

Analogies should be structured according to the principles of constructivism and through an ongoing dialogue between learner and ESD educator. Even though verbal analogies are satisfactory, additional comparisons using shapes and diagrams are helpful for better understanding.

The gradual stages of the developmental process of analogies, as described by Glynn (1994), are the following[7]:

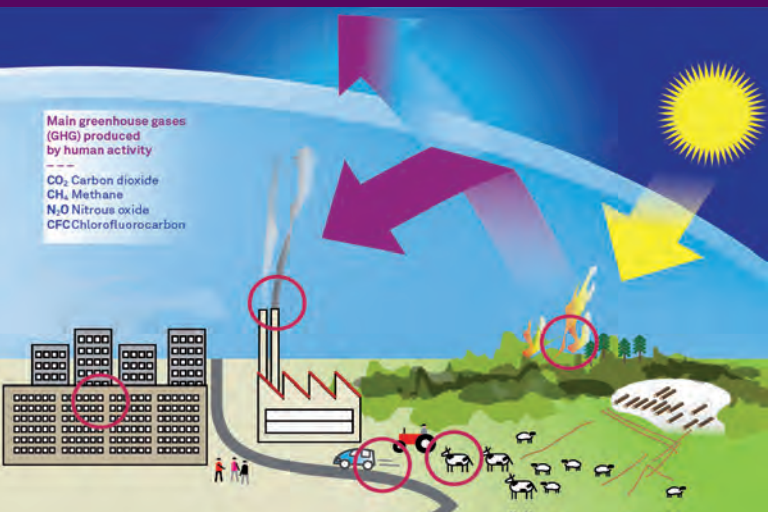
1. Introduction of the new unknown concept (*target*).
2. Appropriate questions that refer to the familiar concept (*analog*).
3. Identifying the connections between the analog and the target (*features*).
4. Determining the point where the analogy is no longer valid.
5. Making conclusions.

Obviously, each analogy has limitations since no *analog* perfectly matches the target. Every *analog* has corresponding and non-corresponding features to the target and the choice to use a specific analogy, instead of another, should be based on the educational intentions. Two analogies may differ greatly by comparing two different characteristics of the same target - and wherever this is the case, it is wise to use both: For example, the term "greenhouse effect" derives from an analogy comparing the functioning of a greenhouse (where the air inside has a higher temperature than the air outside). Another analogy that can be used to explain the increased kinetic energy of greenhouse gases is the non-stop motion of a ball in a pinball machine. Using more than one analogies on one hand decreases the chance of considering the *analog* as identical to the *target* (misconception) and on the other, by highlighting different aspects it provides a more comprehensive idea of the *target*. In this case more emphasis is given to the primary analogies and less to the supplementary ones.

It is important for the *analog* that is used to be both familiar and comprehensible coming from the daily life of learners or from concepts that have already been covered in the curriculum. The latter analogies have an added advantage in that they are a form of review and as such reinforce the understanding of concepts already taught. Besides, the great advantage of analogies is that they are based on previous knowledge.

7. The same steps can be applied while explaining the functioning of a model.

Excerpted from
The greenhouse effect (see p. 44)



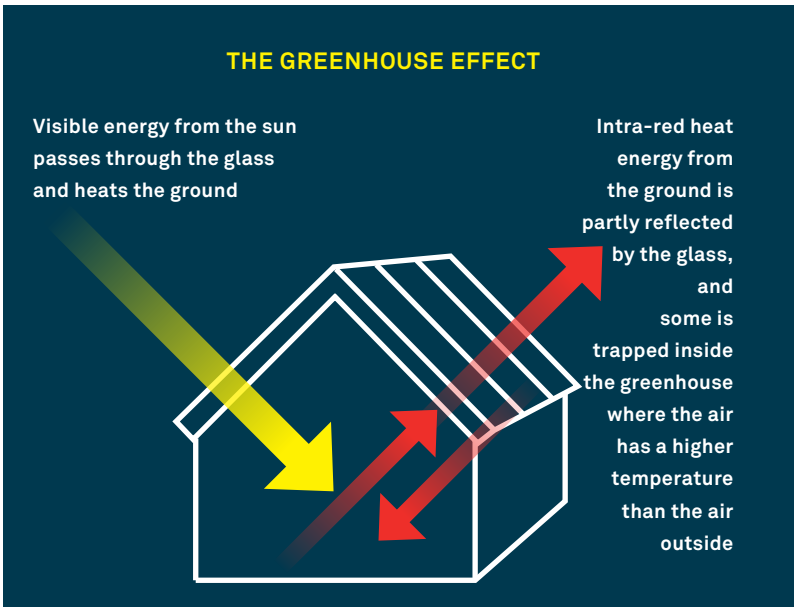


Table 24
Suggested activities based on the use of analogies

Subject	Objective	Description
Natural selection	**For learners to realise that in nature those organisms more adaptable to the environment are those that survive.**	An equal number of green, brown and red thick pieces of string are scattered in the field (can be coloured pasta or beans). Two minutes are given in order to locate and collect all the items. Usually, most of the items gathered are red, fewer are brown and even fewer are green. Using the appropriate questions, an analogy is built between the string and a living organism (e.g. a beetle); by explaining how an organism's colour may increase or decrease its chances for survival in a certain environment. It is advised to provide several examples so that learners will generalize but not be limited to one analogy (e.g. how a plant with deep roots or thorns has more chance to survive in dry conditions, etc.)
Designated areas	**For learners to practise in finding connections between *analog* and *target*.**	Learners are provided with certain analogies about a BR or other designated area and are then asked to examine the limitations of the analogies. For example, to what extent the protection of the environment in a BR corresponds to: (a) Governing an island in a sea of chaos. (b) The defence of an organism from germs etc. (c) Preserving a family heirloom In the end learners are asked to make their own analogies and to examine their limitations in the same way.

Rather than memorizing, learners look for connections to existing conceptual structures, altering them somehow so as to "incorporate" the new *target* concept (see constructivism).

Thinking in analogies helps with in-depth understanding and strengthens the ability of prediction. Despite this, it is wise to avoid overgeneralizations and inappropriate connections between the *analogs* and *targets* (Glynn, 1994; Kokkotas, 2002). For example, the previous analogy of the greenhouse is an oversimplified metaphor that cannot provide the whole picture of the complex interdependent parameters that determine the atmosphere's temperature. For this reason, the ESD educator must provide constant guidance through the construction of the analogy and, especially during the last steps (4 and 5). Particular attention should be given to analogies that learners identify on their own as this process reinforces self-regulation and autonomy in learning.

Models

Models are the hypothetical representations of systems based on a series of simplifications (analogies) that facilitate their comprehension. A model can be a device, a plan, a mathematical formula, a computer programme or even a mental representation. Whether it is a physical, mathematical or intellectual model, its value lies in that it can explain the most complex functioning systems in a simple way (AAAS, 1990).
The most familiar models are physical: they are devices or constructions that behave in a way that simulates some natural phenomenon/ operation. Physical models usually function scaled to the parameters of time, size or material. For this reason, they are simpler and easier to use than the system they represent. A model's variables can be improved by experimenting, in order to come as close as possible to the behaviour of the system being examined (AAAS, 1990).

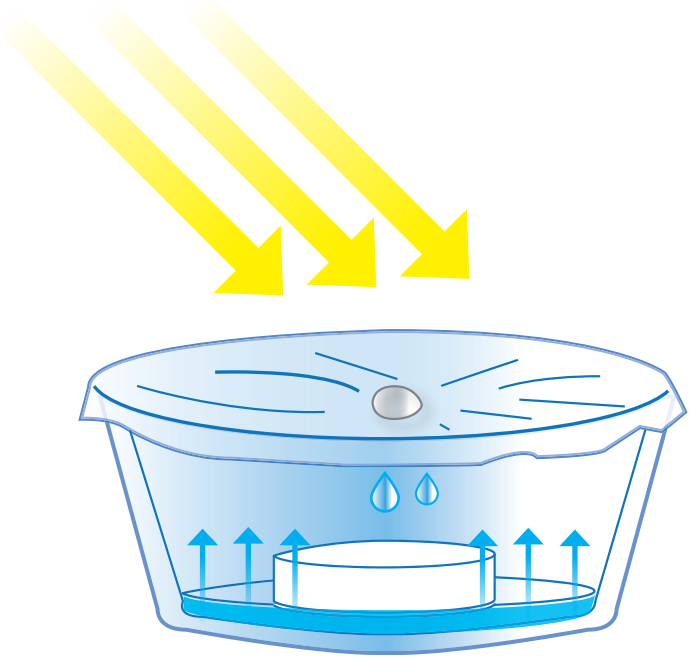
55. Greenhouse, *Hveragerði*, Iceland,

The notion of "greenhouse effect" derives from an analogy comparing the role of the atmosphere in insulating the planet from heat loss to the functioning of a greenhouse

56. *Vanoise* massif, seen from *Little Saint-Bernard Pass*, France
©Michel Le Berre

As in most areas under protection the role of water and the hydrological cycle are crucial elements, we can use a simple physical model to explain phenomena we observe in the field, such as cloud formation, rain, erosion, etc. (Scoullos et al., 2003)
How to construct the model: in a large container with a little water, a small plate is placed, taking care not to let water enter it. The large container is then covered with plastic membrane and a small rock is placed in the centre, it is left out in the sun. What will happen if a drop of food colouring is added to the water in the larger container?

Figure 25
Water cycle model

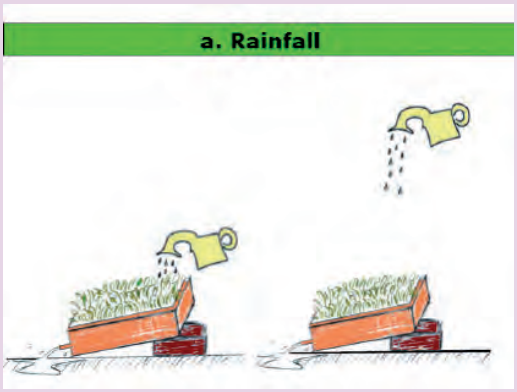


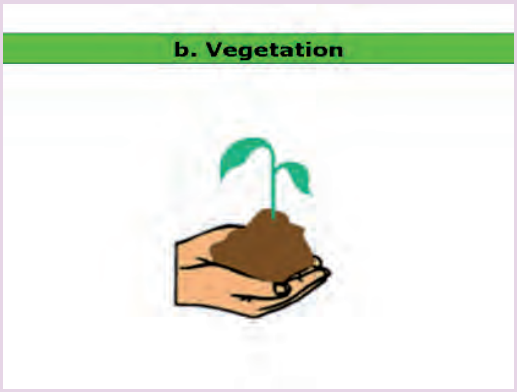
Model		Water cycle
	Analogies	
Large, glass container	← →	**Earth**
Water in the container	← →	**Seas, oceans**
Small plate	← →	**Land**
Plastic sheet	← →	**Atmosphere**
Droplets under the Plastic sheet	← →	**Clouds**
Droplets that fall On the small plate	← →	**Rain, snow**
Small rock	← →	**Areas of condensation** (mountain tops)
Food colouring	← →	**Water-soluble pollutants**

Just as no *analog* completely matches the *target* concept, in the same way no model can precisely represent the functioning of the modelled phenomenon in its entirety. However, these very discrepancies provide clues on how to improve the model (AAAS, 1990). Care must be taken not to create misconceptions by giving a model the attributes that a system does not have.

Since the role of water and hydraulic circuits are important elements to a MAB BR or a DA, on one hand, a specialized design can be included in the topographical relief model and on the other hand, a simple physical model can be used to explain the phenomena observed in the field, such as the creation of clouds, rain, erosion, etc. (see Figure 25).
Because physical models offer hands-on experience they are considered ideal for introducing the concept of a "model" to young children. After the ages 12 to 14, more complex models can be used (AAAS, 1993). At these ages, learners should begin asking themselves about a model's limitations, make suggestions for improving it and even suggest their own models (Engelson & Yockers 1994; Vazaiou, 2002).

Table 25
Studying erosion through models: in groups learners examine the factors that create and develop water erosion – rain, vegetation, inclines and soil type, using one or more pairs of pots. It is important for every group to apply the scientific method; to isolate and test every factor while keeping the rest stable (adapted from Alampei, 2003)

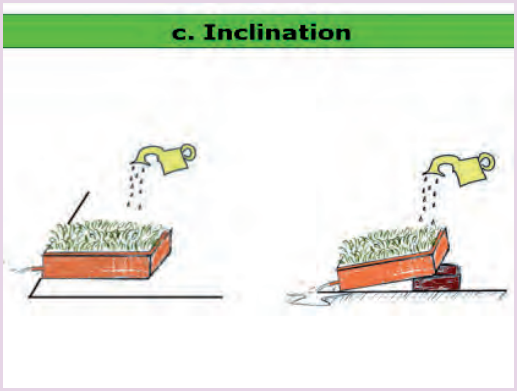


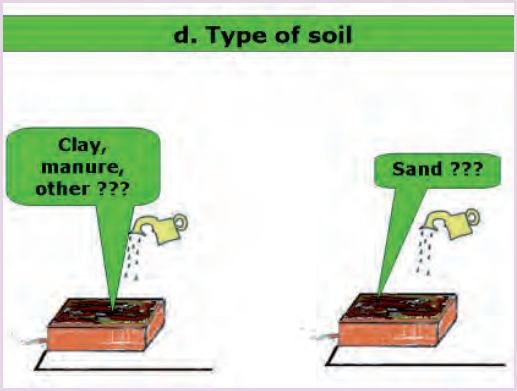


Group A uses 3 pairs of pots (with plants and without) and studies the effect of rainfall on erosion, particularly:
- the height of rain that may cause soil's saturation with water (they water the pots with different amounts of water);
- the force of rain that determines the quantity of fine-grained material that is detached and the force of the water runoff (they water the two pots at different rates and from different heights);
- the frequency of rainfall, which when combined with increased force causes increased soil erosion.

Group B discovers the role of vegetation in preventing erosion, using pair of pots. They water these in inclination and they observe:
- how leaves decrease the force of water drops,
- how the roots of plants support the soil particles,
- how the roots of plants increase soil's porosity,
- how the soil's structure is improved through enrichment with organic matter,
- how the increased evapo-transpiration in leads to better saturation levels. They may observe that by covering the plants with plastic bags.

They may go one step further, allowing the grass to dry, and then burn it, simulating forest fires and observe how the ground behaves then.





Group C studies the importance of ground incline by comparing two identical pots (both with or both lacking grass) one placed on an incline (45 degrees) and the other horizontally. The results are impressive when both pots do not have plants.

The model can be expanded by using pieces of thick cardboard that will serve as terraces on the slope.

The last group studies the significance of the type of soil in the phenomenon of erosion.

This can be accomplished by comparing two or more soil types in terms of water absorbance, structure (how compact they are) and their content in organic–humic compounds that help to retain the soil particles together. It is clear that the more water retained in the soil, the more resistant it is to erosion.

8.10 Values education within ESD

Even though the term "sustainable development" continues to be discussed and interpreted in a variety of ways in scientific circles, among scientists, sociologists and technocrats, no one can dispute that sustainability refers primarily to the quality of the ties that humans develop with what surrounds them. Even though it equally embraces natural processes, economic and political parameters, sustainability is just as much a cultural and ethical issue. It refers to the attitudes and values we cherish and the way we understand the relationships with our fellow human beings, nature, the present, the past (cultural monuments, etc.) but also the future (responsibility for next generations).

In this context the critical factor for sustainable development is the individual and the kind of relationships he/she develops. These relationships can be based on one hand, on personal interest, greed, envy, indifference to other humans and to the depletion of resources or in contrast, relationships characterised by respect, responsibility, tolerance and solidarity and that promote equality, democracy and social justice.

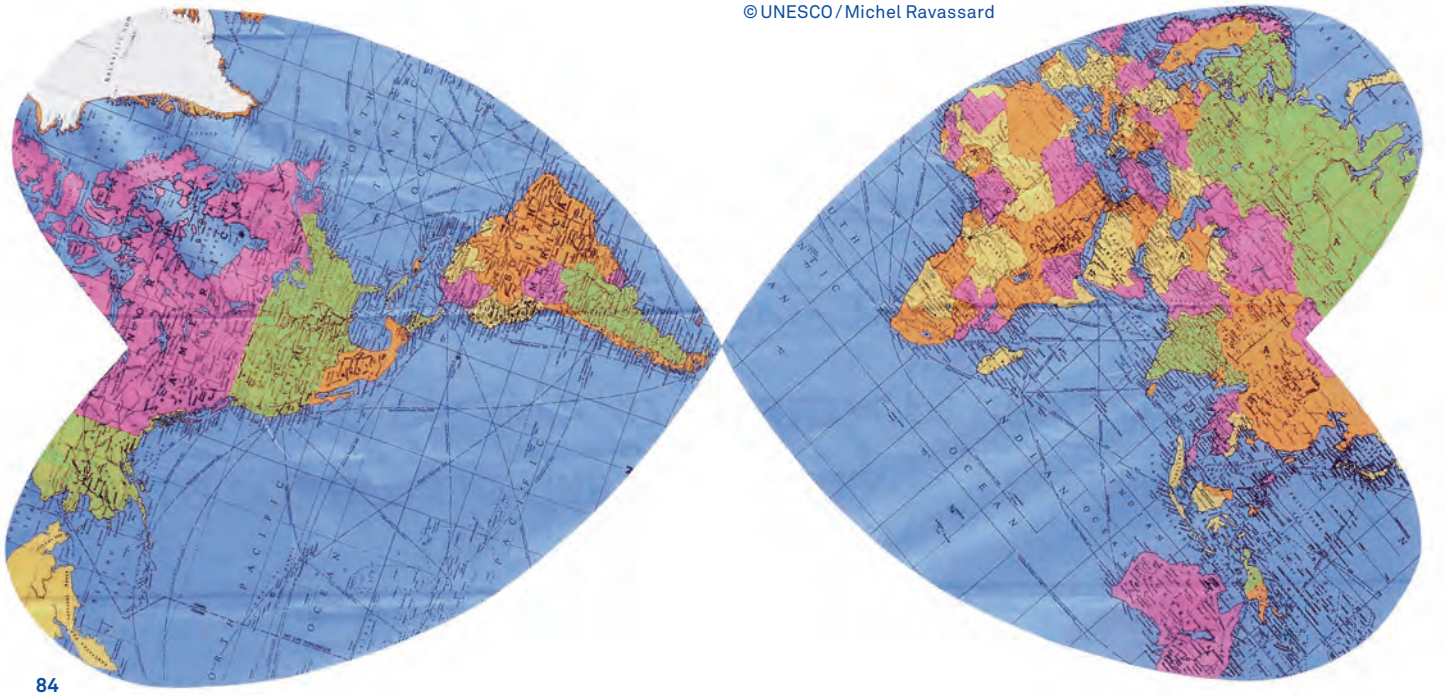
The term "environmental ethics" already introduced in the Belgrade Conference of 1975, is referred to in many ESD texts. Currently, the *UNECE Strategy for the Decade on ESD* states that the moral dimensions of education should be addressed through ESD. This includes equality, solidarity, interdependency, responsibility for present generations, both between generations and between humans and nature (UNECE, 2005). The *UNESCO Draft Implementation Scheme for the Decade on ESD* recognizes that along with the positive spiritual motivations, education is the best way to promote and consolidate values and behaviours for sustainable development (UNESCO, 2005).

But how exactly is this ethical dimension of sustainable development (SD) and education for sustainable development (ESD) defined? According to Engleson and Yockers (1994), an ethic is a sense of what is fundamentally right or wrong, a self-imposed moral code that helps develop related values, to make choices based on these values and to accept responsibility for these choices. Personal ethic is developed as one gains experience in making ethical decisions and subsequently learns from them.

"We need nothing short of a new global ethic – an ethic which espouses attitudes and behaviour for individuals and societies which are consonant with humanity's place within the biosphere; which recognizes and sensitively responds to the complex and ever-changing relationships between humanity and nature and between people."
The Belgrade Charter, 1975

[EE] "should, by encouraging ethical values, prepare individuals for life by understanding the major problems facing the modern world and provide the skills and attitudes necessary to take on a universal role for the improvement of life and the protection of the environment".
The Tbilisi Declaration, 1977

57. Tolerance flag, 2006
UNESCO Headquarters, Paris
© UNESCO / Michel Ravassard



58. *World Philosophy Day*, 2010
UNESCO headquarters, Paris
© UNESCO / Michel Ravassard

59. *Salon Planète Mode d'Emploi*, Paris
©UNESCO

60 and **61.** *International Festival of Cultural Diversity, 2009 Warrior Monks of the Shaolin Temple*, China and *Celebrating Diversity Concert*, UNESCO headquarters, Paris
© UNESCO / Michel Ravassard

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62. Drawing on peace, primary school, *La Varenne Saint-Hilaire*, France
© UNESCO / Dominique Roger

Values, attitudes and beliefs

Values comprise complex formations through which humans show their preferences for specific ways of life and living conditions. Despite the significant number of studies conducted on the subject during the past decades, there are still many disagreements on the interpretation and the use of the term itself (Halstead, 1996), as with the term "attitudes". The variety in definitions, each of which emphasizing on a specific element reflects the variations in the opinions of the scientific community on these two terms (Vosniadou, 1999). For the scope of the present publication, an explanation of the relative concepts is given in Table 26, in order to avoid confusion as regards terminology.

Table 26
Explanation of the terms "facts", "beliefs", "attitudes" and "values"
(based on the definitions given by Caduto, 1985; Engleson & Yockers, 1994, Hungerford et al. 1994b; Knapp, 1999; UNESCO, 2002)

Facts A fact is information that corresponds to objective reality. An individual may claim that something is a fact, but the truth of the claim can be tested to determine its accuracy.	Example: The apples are red (this is a fact, but the apples may be green or yellow...). Combustion from fossil fuels releases CO_2.
Beliefs Belief is conviction for the reality of some phenomenon, usually based on the repeated examination of facts. Beliefs can be challenged as regards their accuracy or the comprehensiveness of the facts considered.	Example: (I am confident that...) volunteers offer significant help in forest protection. (I consider that...) overpopulation is a fundamental cause of environmental problems in some developing countries. (I believe that...) engaging in environmental activities is the "fashion" of our day.
Attitudes Attitudes predispose individuals to react in a certain way (positively or negatively) to a stimulus. They have three aspects: the affective, the cognitive and the behavioural. They are shaped primarily by evaluating judgements on some subject. Attitudes are not necessarily reflected in a performed behaviour. They are not so deeply felt as values and may change as a result of a new experience or knowledge.	Example: I do not like big cities because they are noisy. I am for the idea of volunteerism for the environment (but this does not mean I am a volunteer myself...). I am bothered by the arbitrary and chaotic rate of construction.
Values Values may be ideas, actions, situations or things that individuals consider worthy to them. They are mostly social constructions as they refer to what is considered as important to small (family) or large groups of people (society). They also describe certain character traits that have always been considered as virtues. By being central to personality, values tend to influence attitudes and behaviour.	Example: I value all living things in the highest regard. I consider honesty as one of the most important characteristics of human communication. I think it is important to be famous and recognized wherever I go. I feel good when I am of use to others. I believe that financial reward should reflect the work carried out.

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63. 35th General Conference exhibition *Cultures and Developments*, UNESCO headquarters, Paris
© UNESCO / Michel Ravassard

64. Port activity with merchant ship, *Venice*, Italy
© UNESCO/ D. Roger

65. Acid rain affects spruce foliage, *Le Donon Forest, Vosges*, France
© UNESCO / P. Dewarez

66. *Cité des Sciences et de l'Industrie*, Children's city, popularization of sciences, Paris
© UNESCO / D. Roger

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Values are the standards driving society, politics and religious behaviour; they influence the way humans present, evaluate and compare themselves to others and how thy rationalise their behaviour as consumers, professionals, parents, residents, visitors, teachers or learners. However, how aware we are of our own code of values and the way it relates to our actions, varies from person to person (Knapp, 1999) ranging from very little (when acting out of habit or by chance, etc.) to a great deal (when acting out of choice or with self-awareness).

Various classifications have been developed for value systems[8] while current educational literature explores the way values influence behaviour[9] if there are universally accepted values and how these are promoted through educational systems of countries but also how an educator can promote them.

There has been a discussion in EE literature on values (e.g. Hungerford et al. 1994b), and more so in ESD as this type of education is value-based (respect, solidarity, equality and justice etc.). Actually in ESD, it is unconceivable to approach the idea of sustainable development neutrally. For example, when looking at production and consumption models, one has to refer to the values behind these models. The very differentiation between sustainable and non-sustainable is charged with value judgements.

When and how are values developed?

Values begin being cultivated at the very early stages of development, by family, society and the religious environment. As individuals grow, their values are influenced by the peers, the media and school environment (Glascow, 1994; Halstead, 1996; Knapp, 1999). Throughout life, the value system develops in a dynamic way (Caduto, 1985), so, with critical thinking, individuals are likely to adopt, adapt or reject values at every stage of their life.

By recognizing that moral development takes place gradually, the theories of Kohlberg and Piaget hold that children must be helped in this process both by exposing them to situations of moral conflict and by being influenced by others who function at a higher level of moral development. This process does not intend to transfer

8. Rokeach in 1973 first divided the long catalogue of values into final and functional. Lickona classified them into moral and immoral. Hungerford suggested an open grouping of values etc.

9. The three models that stand today related to the factors that influence behaviour can be found in the Annex.

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67. Web of life game 2007 *World Scout Jamboree*, UK
© Bernard Combes

68. Discovering a water monitoring kit, *Uppsala*, Sweden
© Bernard Combes

69. *Auroville* children choir, UNESCO 65th Anniversary, Paris
© UNESCO / Michel Ravassard

70. Presenting water monitoring results, *Uppsala*, Sweden
© Bernard Combes

values and attitudes, but rather helps guide towards natural maturity and moral orientation (Caduto, 1985; Hungerford et al., 1994b).

The transition from moral dependency to independence is estimated to take place at around 11 to 12 years of age, but with a wide range, middle "grey" area. Before this age most children do not yet have high ability of cognitive and moral reasoning; they are unable to recognize the complexity of human motives and usually lack a personal code of ethics (Caduto 1985; Hungerford et al. 1994b; Engleson & Yockers, 1994).

After the age of 12, children begin to examine the logic and consistency of their own beliefs and compare them to those of others. Often through conflict, they begin to understand that there are underlying principles beyond specific situations and then begin forming their own personal ideology, their system of beliefs and values. For this reason, this age is considered the most appropriate to apply approaches that enhance self-awareness, independence and the sense of self-esteem in teenagers, and make them take a stand towards societal and environmental issues (Caduto, 1985; Hungerford 1994b; Papadimitriou, 1998).

Taking into account that certain personality parameters are formed at a very early age, even before school, and that these remain unchanged throughout life, it is advised to implement some value-based approaches also at the primary education level (Titus, 1994). There are no "prohibited" subjects for these younger students but the approaches must always respect the developing personality of the child. For these ages outdoor visits emphasize the development of emotional and aesthetic perceptions of nature (Caduto, 1985). Activities that engage democratic decision making, collective action and responsibility in the children's daily life are also appropriate (Andrews, 1994).

Teachers should not be disappointed if little progress is made in such interventions. Firstly, because values are shaped by many other factors other than education (UNESCO, 2005) and secondly, because values development is a lengthy process that goes on throughout life and perhaps educational interventions may not pay off until the distant future (Caduto, 1985).

Table 27
Activities oriented towards developing Ethics of Sustainable Development

Level: Early grades in primary school	
Method: Visits to natural environments / BRs/DAs	The goal is for children to discover nature mainly through their senses. They play games that involve the sense of touch, smell and hearing but they will also observe objects in nature. They may collect specimens and record their experiences using drawings, recordings and short essays. Negative behaviours in the field (e.g. littering, etc.) should also be discussed. Supplemental activities can also be designed (collage making, writing letters, making announcement boards etc.).
Level: Later grades in primary school	
Method: Discussions using games	Environmental issues such as overpopulation, urbanization, water pollution and poisoning, species extinction, erosion etc. can all be addressed through games. An example on natural resources and population: students sepa-rated into groups of varying sizes represent the populations of different countries. One group may have 3 students, another 4 and another 14 etc. Each group is given a few candies that represent the corresponding amount of resources available in these countries (e.g. food). Larger groups will have to share fewer candies, while smaller ones have them in abundance. Students' reactions range from satisfaction to strong discontent and perhaps loud protest for the inequality in distribution. The discussion that follows addresses world geography, economics, consumerism in the developed world, the depletion of resources by developing nations for reasons of survival, etc.
Level: Secondary school	
Method: Studies, case studies, simulations, group research	Appropriately selected case studies, in particular for DAs, help adolescents to recognize the issues and people/organisations involved, to determine perceptions and values and to analyze possible environmental, economic and social consequences of each suggested solution. Simulations, where players take on roles corresponding to people involved in a given issue (rather than simply reading about it), encourage them to defend their positions that they may not have otherwise taken seriously. Group research on environmental issues gives students an opportunity to practice collecting information from primary (questionnaires, etc.) and secondary (authorities, media, etc.) sources, to analyze data, in stating their own position on an issue, and, if they decide, to create and implement an action plan in order to resolve it. Such activities help students examine the values of others, to recognize their own and to compare them with the most advantageous for the residents' quality of life and the DA environment.

Approaching values in ESD

According to Fernandes (1999) values teaching in education can be divided into three approaches: a) the direct approach by systematically and deliberately teaching values that are dogmatically correct, b) the indirect approach by applying educational programmes and activities to cultivate and develop values and c) the coincidental approach of addressing values only as the need arises or circumstances call for it.
In literature there are various educational strategies on cultivating values. Caduto (1985) refers to eight strategies that range from zero intervention (*laissez faire*) on one end of the spectrum, to indoctrination or imposing values on the other. In practice, a limited ESD programme for a designated area may prove difficult for an educator to uncover the learners' attitude and values, much less cultivate them. But a well-designed programme can lead learners to the road of reflection and rethinking of their own values and behaviours (Kamarinou, 2002).

For the purpose of this publication, focus will be placed on two widely-used strategies: values clarification and values analysis.

71. Young boy observing a tree stump, *Durmitor National Park*, Montenegro
© UNESCO / Pavle Jevremovic

72. Activity organized on turtle day, *Zuvintas BR*, Lithuania
© Meteliai Regional Park

Values clarification

Values clarification refers to an internal series of actions that individuals use to set their own values; this focuses more on the process rather than on the content. Through conflicts and agreements, the clarifications strategy aims to help learners become aware of their values system by examining their emotions and their way of thinking (Fernandes, 1999, UNESCO, 2002). The higher aim is to strengthen individuality, to increase self-worth and the capacity for self determination (Papadimitriou, 1998).

Values clarification strategy was developed in the 60's and the 70's especially through the works of Raths (Raths et al., 1966) and Simon (Simon et al., 1972). Raths suggested that the implementation of activities provides the learner with the opportunity to (1) choose freely (2) among alternative choices, (3) after having considered the consequences of each one, (4) to feel good about his/her choice, (5) to affirm it publicly; and (6) to act (7) repeatedly based on his choice (value). These gradual steps of involvement can be presented in the form of a grid (suggested by Glascow, 1994; UNESCO, 2002; Scoullos & Malotidi, 2004), so that learners can see their degree of involvement in various issues, by using a seven-level scale as presented in Table 28.

Other techniques applied in the clarification strategy are role playing games, activities outside the classroom and groups discussions. It is not the educator role to make fundamental statements on the judgement, classification or introduction of values. Rather, it is to ask questions and to keep the issues open for discussion instead of looking for unanimity or consensus.

The whole approach of values clarification is essentially based on two assumptions: (i) that children will have greater interest in the values that they have set themselves and made their own (than those simply passed down by adults) and (ii) that because values are connected to culture and to personal preferences (therefore they are not judged as "right" or "wrong"), every effort to teach selected values may be seen as a indoctrination, and would be inappropriate especially in modern, pluralistic societies. The educator's role is certainly not to make substantive statements, but to pose questions, and to keep issues open than seek consensus.

Criticism of values clarification strategy is fundamentally based on the same assumptions: the method may encroach on learners' individuality since pressure is put on them to state their preferences. Additionally, the neutrality of the educator, who is non-judgemental of the values learners arrive at, may cause their failure to differentiate between personal preference and values; between moral and immoral; between right and wrong (Caduto, 1985; Titus, 1994; Papadimitriou, 1998). For this reason, this method is considered appropriate for learners that are morally independent, older than 11 to 12 years old and for experienced educators (Caduto, 1985).

73. *Claude Monet Collège, Paris* region, pupils and teachers trained to mediation and violence prevention, ©UNESCO/ Michel Ravassard




74. Eco-building, The Netherlands
©UNESCO

75. Recycling begins in primary school, Brazil
©UNESCO/ASPnet/Ligia Brull

Values analysis

Values analysis strategy involves using logical and scientific thinking for multifaceted examination of issues. Its ultimate goal is to help the individual to apply a deductive reasoning in exploring values and making decisions in their own lives (Caduto, 1985).

Common techniques applied in values analysis include moral dilemmas, role playing simulations and text analysis. The ESD educator's role is to draw out the learners' values as they examine an issue and to act as an active listener without judging or approving. Those who take part in a well-executed values analysis activity develop the ability to empathize, to put themselves in another's place in conflict situations. Questions to be answered during values analysis include, for example, what others are involved, what are their motives and positions, how are conflicts created, etc.

Appropriate issues for values analysis related to designated areas are, for example, the construction of a modern port on an island, the construction of a highway or a dam, the divergence of a river, residents' interest in developing tourism facilities (lodging ,taverns, etc.) in or around a designated area...

In the case of a moral dilemma, learners are helped to discover the limitations of their own moral thinking and to move toward a higher level of moral development through discussion (Caduto, 1985; Halstead, 1996; Papadimitriou 1998). The approach is based on Piaget and Kohlberg's theory that supports the idea that the ability to form complex moral judgements develops gradually. Nevertheless, for dilemmas to be realistic, they must be directly connected to the learners' lives and experiences (UNESCO No. 15, 1985; Andrews, 1994, Fernandes, 1999; Brunner et al., 2001). Many authors emphasize the importance of practicing decision making.

Values analysis uses objective criteria based on cognitive skills. However, because values are not data (see Table 26, p 206), some question this rational approach. Critics point out that individuals are aware of and communicate their value system primarily through empathy, rather than through strict, rational approaches (Caduto, 1985).
Naturally, values analysis strategies described above can be applied in combination with other strategies and methods -in drama play or in case studies, for example. Specific examples of activities that can be incorporated in values education are presented in Table 28. The designer and educator are called upon to decide how and when to incorporate such activities in an ESD program for a designated area, so that they have maximum effect (Hungerford & Peyton, 1994). These kinds of activities demand extensive educator experience.

Communication and evaluation of values education

In values education, learners make their judgements known, argue them and substantiate their thinking (Hungerford & Peyton, 1994). As is expected, they discover many different views when discussing values. This is a good opportunity for learners to develop ways in which they will react when facing opposing views.

1. Everyone has the right to refuse: If any one finds that a question is sensitive or difficult he/she has the right to decline to answer.
2. Respect each others opinions: Since the value discussions involve neither right nor wrong, we cannot criticise each other. Contrary, everyone is entitled to state their opinion.
3. Speak for no-one but yourself: During the discussion the use of the first person should be stressed (i.e. "I think/consider that ...") instead of sweeping statements and generalisations (i.e. "Most people believe that...").
4. Don't interrupt: Besides being dismissive an interruption is impolite and disrupts the speaker's concentration

The rules of discussion can be adapted accordingly to each subject. Of course, depending on the learners' maturity and experience, an ESD educator may not have to provide rules but may ask them to set their own code for holding discussions.
Because discussions on the subject of values tend to engage learners by uncovering new insights, the time available to conduct visit may prove to be insufficient to cover an issue. In these cases, the teacher may need to make conclusions or to arrange for another time, if this is possible and feasible.

Generally, discussions on values improve verbal communication skills, providing learners with the ability to express and to think critically and in depth on a number of complex subjects. Adolescents in particular develop a sense of security and self-confidence through contact with peers and others in their environment (Bruner et al., 2001). At the same time, the values analysis and clarification process cultivates tolerance.

Table 28
Games and activities related to values' analysis and clarification in MAB BRs, Protected Areas (PAs) or other Designated Areas (DAs)

A. Order of Priorities (rating)

Subjects with several alternatives are shown, which the learners enlist (rate) accordingly. The steps are:
1. The rating list (one or more questions with alternatives) is handed out or written on a board.
2. Each learner individually classifies ALL the alternatives, in order of preference.
3. The learners in small groups EXPLAIN in turn the ranking and their priorities. They discuss similarities and differences amongst them.
4. Each group describes in short the followed procedure to the class. A discussion in class may reflect the general perception and additional opinions on the subject.

If you were in charge of compiling the management plan for the DA in your area (see parag. 4.4) which productive activities would you set as a priority and why?

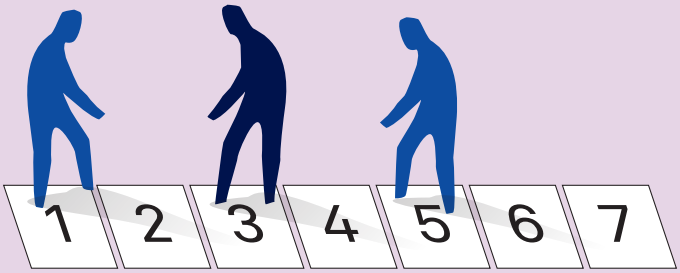
Agriculture **Fishing**
Stock Farming **Forestry**
Tourism

If you were in charge of funding for environmental improvements in your country, classify the following subjects on which you would focus:
- Reduction of greenhouse gases
- Pesticide free food and agriculture
- Healthy DA (wetlands, forests and seas)
- Waste management

B. Stand in line

Kinetic game where the players locate their position between two anti-diametrically opposed positions. The players are called to place themselves on a line, regardless of where their fellow learners stand. The ends can be numbered for example from -5 to +5 or from 1 to 7.
The steps of the method are:
1. The educator formulates the subject and presents two contradictory views on it.
2. The players are given a minute to reflect and stand on the number that reflects their opinion.
3. Players are grouped according to their number, and in turn explain their choice within those groups.
4. A learner from each group justifies the group's position to the whole set of players.
5. A discussion in plenary may begin based on the views of the groups and the game (steps 1-4) can be repeated to check if anyone after hearing others' arguments wishes to change position.

Alternatively, when anonymity is preferred, the participants support their positions by writing two-three sentences on paper which they hang on a long rope between the two opposites.



Subject: the management of a DA
EXTREME 1. In a DA the prevailing opinion must be that of locals, since it is them who either benefit or are harmed by "protection".
EXTREME 7. Because the DA serves the total of the residents of the country, perhaps even the planet, collective interest should prevail over local interest.

Subject: examination of the eco-centric vs anthropocentric orientation
1. Every aquatic form of life needs to be protected, regardless of the value that is assigned to it.
7. It is essential to protect primarily aquatic species which are important to humans.

In a developing country it is essential to protect...
1. The biodiversity of the DA.
7. The vital needs of residents.

C. Values grid

By means of a brainstorm the learners make a list of issues that concern them. Then they rate their opinions and degree of commitment towards these issues, according to the following scale (Raths):
1. I have chosen my position freely,
2. from alternative choices,
3. after thoughtful consideration of each option,
4. I am proud to support my position,
5. I affirm my position publicly,
6. I act (based on my choice),
7. I repeatedly and consistently act.
Afterwards they compare their opinions either in groups or in a plenary session.

A. All people should have access to sufficient amounts of good quality drinking water.
B. The flora and fauna of a DA should be preserved by the authorities.
C. The flora and fauna of a DA should be preserved by the residents...

	1	2	3	4	5	6	7
A							
B							
C							

D. Unfinished

This activity is suitable for both introduction and evaluation. The steps are the following:
1. The individually learners complete 1-5 sentences expressing their opinions.
2. They form small groups and in turn read them out. They discuss similarities and differences.
3. Each group presents the procedure to the class.
A discussion in plenary follows, examining the alternatives proposed, the values they imply, the ways to improve their formulation...

- When someone is cruel to animals...
- If I saw a friend disposing of a bottle in a BR...
- In order to save energy in the BR we could...
- The most important environmental problem in my neighbouring DA is...
- We could improve the area's economy if...

E. Analysis of texts

1. The instructor presents the learners with a chosen text (i.e. Press article about the DA).
2. The learners read the text and identify the main stakeholders, as reflected in it.
3. The learners underline the phrases in the text where that reflect the positions of the stakeholders.
4. The learners detect the stakeholders' values based on the underlined phrases.
5. The learners contrast their own values to the stakeholders' as well to those of the writer of the article.
Example for application

A. They are given two texts that outline the kind of management of two different DAs (of different countries). Many values can be implied in these texts, i.e. the relationship of locals to the authorities, to NGO's etc.; the applied economic model...
B. Based on a common subject or the same BR, articles, advertisements, etc. are collected. The learners should discover the values implied in these texts and photos, and compare the approaches.

Evaluation of activities related to values is a difficult task, even when clearly defined educational objectives have been set. Learners must be evaluated on the process of classification and analysis and not on the content of the values they express. In this way, educators are encouraged to develop their appropriate evaluation indicators. These may be quantitative (e.g. control catalogues) or qualitative (e.g. descriptive). They may refer to various factors, such as learners' behaviour, expression of interest, enthusiasm and curiosity, desire to take action and even the kinds of questions they pose etc. In programmes that run longer, it is a good idea for learners to maintain a calendar and portfolio where they can keep a record of their projects (Hungerford & Peyton, 1994; Glascow, 1994; Fernandes, 1999; Knapp, 1999).

Table 29
Proposed values analysis activity in a Biosphere Reserve (BR), a Protected Area (PA) or other Designated Areas (DAs) (adapted from Staniforth et al., 2002)

The learners rank elements of their direct environment, firstly for themselves and then placing themselves in the position of other people or living organisms...

- **1.** We hand out a list to the learners, explaining that the list contains elements of the area they live in.

- a big house	- a forest	- a wildlife park
- the national road	- a swamp	- a tree farm
- a shopping mall	- a river	- farmland
- wild animals	- endemic plants	- grasslands
- a school	- a hotel	- a listed building (i.e. windmill)

2. Round A: We ask learners to rank individually the elements judging from what is more important for themselves and their life. In groups of 2-3 they compare and discuss each ones ranking.

3. Round B: We give out roles to everyone, of people whose income depends on the PA, i.e., a farmer, a tourist-guide, estate agent, a botanist, etc. They repeat the procedure, this time in their varying roles. After individual ranking they discuss their choices in groups.

- **4. Round C**: Everyone chooses a favourite animal or plant that lives in the area. They repeat the ranking, this time in the name of this animal or plant. Again in groups they discuss their choices.

5. In plenum, the learners are asked to discuss the following reflection questions:
- Are there predominant trends for the first choice in each of the three rounds?
- What are the main differences of the three rounds?
- For which of the three rounds was the ranking more difficult and why?
- Did someone think of future generations while ranking the elements? Why or why not?
- What are the benefits and what the costs of each choice? For example how the ranking of the swamp much below the shopping mall may eventually affect the swamp, and so on.

76. *Aigues Mortes Ramparts*, *Camargue BR*, France ©UNESCO/O.Brestin

77. Traditional house in *Camargue*, *Camargue BR*, France ©UNESCO/O.Brestin

78. Dune stabilization system, *Camargue BR*, France ©UNESCO/O.Brestin

79. The mechanical harvesting of salt, *Aigues Mortes*, *Camargue BR*, France ©UNESCO/O.Brestin

80. The manual harvesting of fleur de sel, *Aigues Mortes*, *Camargue BR*, France ©UNESCO/O.Brestin

81. Stud farm of Camargue horses, *Camargue BR*, France ©UNESCO/O.Brestin

82. The marshes near *Port-Saint-Louis*, *Camargue BR*, France ©UNESCO/O.Brestin

Investigation of the concept of protection through web charts

This learning activity aims to investigate the concept of protection and its relationship to values. It is proposed for the level of primary education:
1. After being reminded of the communication rules during brainstorming (respect of others' ideas, equal opportunities, no criticism, etc.), the learners are divided into groups of 4-5 and each group is given a large card or paper.
2. Round A: Given the central concept "I PROTECT" the ESD educator asks each group member to think of something they had to protect themselves at some time and from what. This can be an object (i.e. toy, photograph, collection), a living organism (i.e. pet, plant) or even something immaterial (i.e. the memory of the best holidays, a favourite story). Time is given to the groups for brainstorming and writing their ideas on a radar chart.
3. With a different coloured marker the educator asks them to fill in to their radar chart the cost of their choice, what they had to change or sacrifice in order to protect the above mentioned item (i.e. to safely keep the favourite doll, means that I won't be playing with it etc.).
4. In plenum, the groups expose their radar charts and explain their approaches.
5. Round B: This time the web is constructed by the educator, using the central concept "WE PROTECT". The educator asks learners in plenum to name material or immaterial items that people may protect collectively (i.e. the residents of a village might wish to protect an old plane, a monument, a building etc.). A discussion follows considering the criteria and distinctions between the things we protect individually or collectively.
6. Round C: At this level, that takes place also in plenum the central concept of brainstorming is "PROTECTED AREA". The learners are called to think and write down reasons for which an entire area may need protection and the cost of such an option (i.e. visits may be prohibited in the core zone and so on).
7. At the end of the activity it is recommended that the educator presents some international or national criteria for establishing protected areas (i.e. MAB BRs, Natura 2000, etc) thus allowing the learners to locate similarities and differences.

83. Common bulrush (*Typha latifolia*), near *Fiélouse*, Camargue BR, France ©UNESCO/O.Brestin

84. Black-winged stilt (*Himantopus himantopus*) *Marismas del Odiel BR*, Spain ©UNESCO/O.Brestin

85. Western Green Lizard (*Lacerta bilineata*), near *Méjane*, *Camargue BR*, France ©UNESCO/O.Brestin

86. Blue Darner (*Aeshna cyanea*) near *Méjane*, *Camargue BR*, France ©UNESCO/O.Brestin

87. Cicada, *Monfragüe BR*, Spain ©UNESCO/O.Brestin

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8.11 Simulation and dramatisation

Simulation and dramatisation exercises in general provide excellent strategies for promoting the understanding of the options which have to be considered in taking a decision on any issue, environmental or other. The qualitative, quantitative parameters come into play present, past, and future, thus reinforcing the idea of humans as part of the environment (Glascow, 1994). Such experiences may function as a stimulus for more traditional teaching and learning methods, such as writing and discussion.

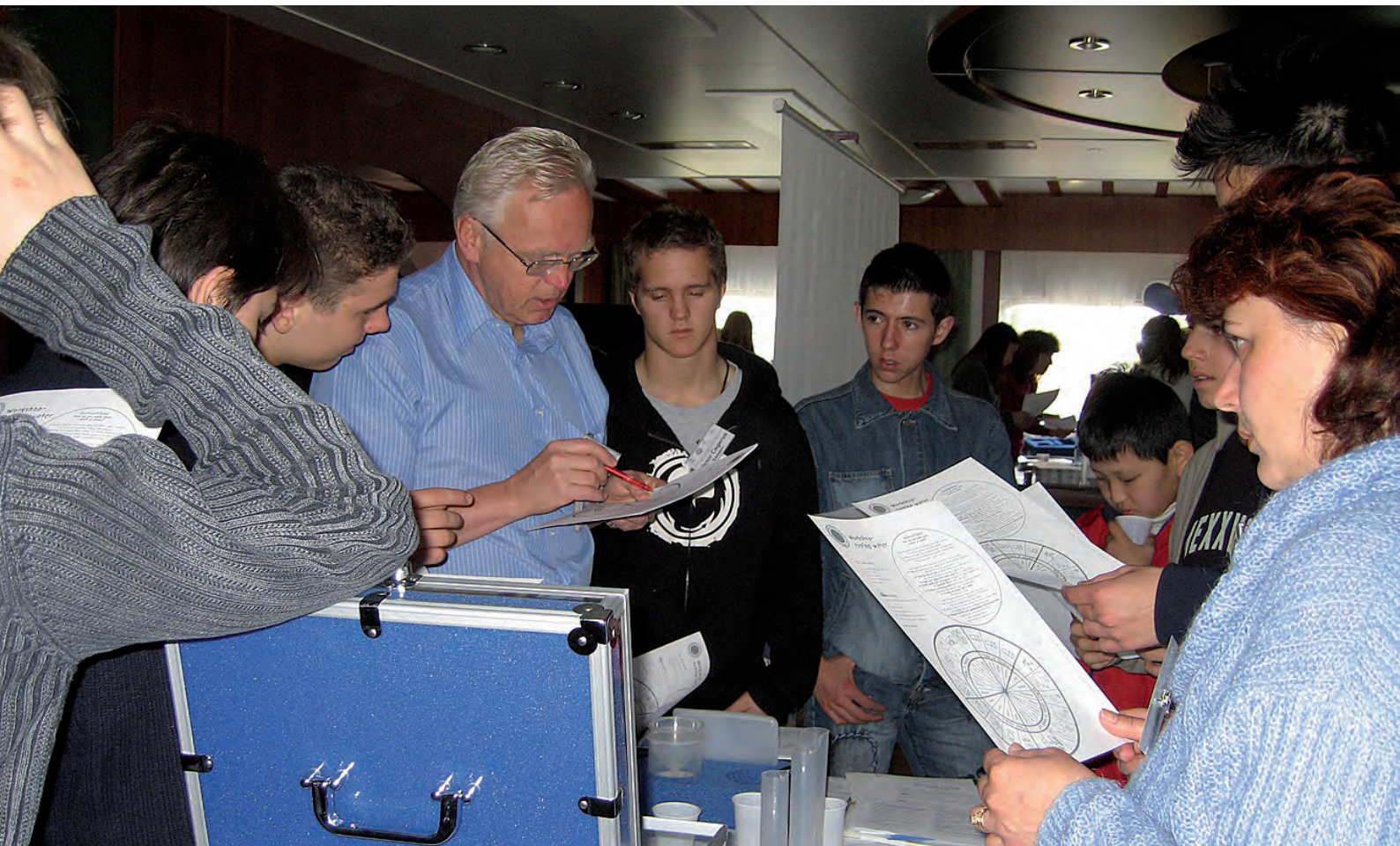
Ideally, players should not engage in such exercises unless they have been adequately prepared in terms of *content* and *process*. To this end, scientific information, articles, etc. on the main theme may be studied in advance. On the other hand, these are improvisational techniques, requiring a feeling of safety and trust. This is particularly important for inexperienced players or in cases when they are not familiar with each other. The sense of safety may be cultivated by appropriate warm-up and trust building exercises (refer to Table 14 p 166). All players should be empowered to enjoy such primal vehicles of self-discovery and self-expression without being concerned whether they are 'good enough' and without being judgemental to the players.

Role playing, panel discussions and debates

Role-plays, panel discussions and debates are simulation methods that allow learners to 'get inside' and 'experience' an issue through the viewpoints of the relevant stakeholders (players). The participants portray certain well-defined characters (e.g. local authority officers, farmers, ecologists, consumers, etc.) in the context of a given situation with conflicting interests, seeking a resolution.

The preparation phase is rather important for an effective role play. Players prepare by reading articles, studies, by interviewing experts etc. on the main theme. Group discussions will point to the social groups affected by it (players). This will help them to start forming arguments for each player, a process that, in practice, may prove rather difficult. The ESD educator has a key role in preparing the scenario and the characters description during this phase, ensuring that all contradicting interests are represented.
To perform the actual role-playing the roles are assigned by the educator or by chance, to individuals or groups of individuals. In many cases the discussion outcomes are 'leaning' towards the 'stronger' negotiators that is why it is essential to have balanced representation in all groups. Some time is given to groups to prepare

88. Teachers and students testing water quality, *ASPnet Great Volga River Route project cruise*, Russian Federation
© Bernard Combes



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89-90. Drama activities with youth, *Lonjsko Polje Nature Park*, Croatia
© MIO-ECSDE

91. Teachers carrying out water monitoring tests, *ASPnet Great Volga River Route project cruise*, Russian Federation
© Bernard Combes

convincing and valid arguments and then the players perform in role (usually one person from each group). Panel discussions begin with a first round of presentations of positions, followed by a second round of comments and a discussion with the audience. A moderator ensures equal time to speakers and keeps the discussion 'on track'. Because this role demands advanced facilitation skills, it is usually undertaken by the educator (Glascow, 1994).

Throughout these exercises it is important to seek consensus and compromise instead of engaging in exhausting confrontation. Learners will, therefore, realise that only through cooperation of social groups will they reach a commonly accepted solution. Following the simulation, a debrief activity that relieves the congestion and smoothly moves the players 'out of role' is necessary.

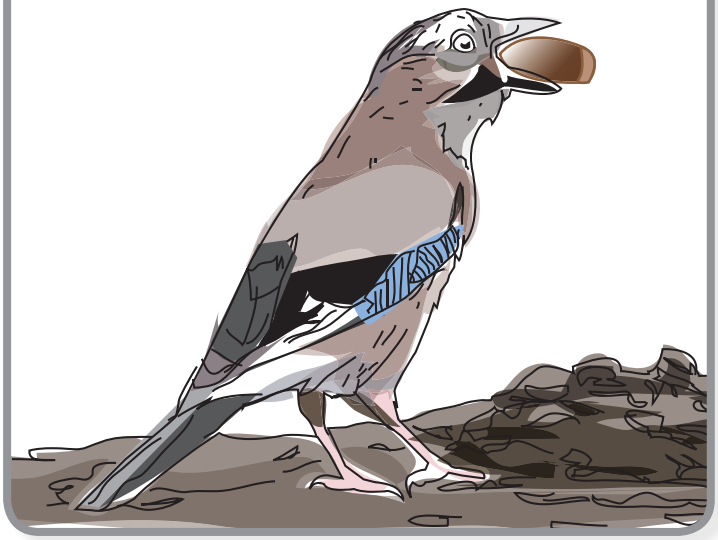
This can take the form of discussion, writing (e.g. a letter to the mayor), drawing (e.g. how the negotiated area will look like 10 yrs later), etc.; however always in relevance to the activity's set objectives.

The overall process helps in developing skills related to i.e. thought organisation; precise presentation; main points' extraction; distinguishing relevant from irrelevant; identifying ambiguous claims etc. but also to identifying others' underlying values and attitudes, detecting bias and naturally conflict resolution (Lahiry et al., 1988; Smith, 1998; Walker & Zeidler, 2003). In cases of young children the characters portrayed could be organisms of the food chain, legendary and mythical creatures, etc. (Scoullos & Malotidi, 2004); however this process can be considered more of a drama than a role play.

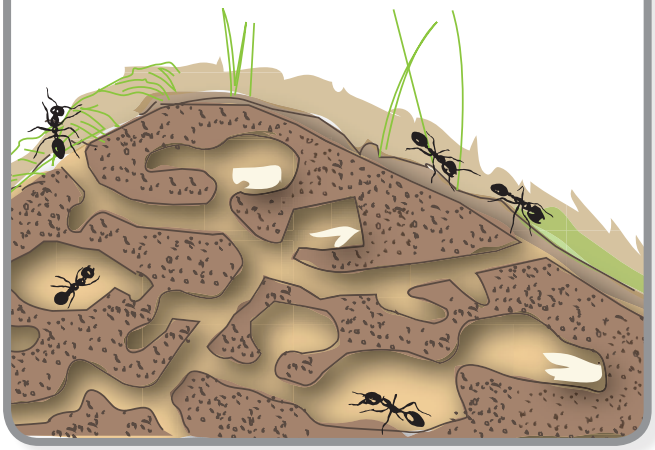
Dramatisation

While a typical role play or debate is based on the ability to apply logical thinking, form arguments, etc. a typical drama is emphasising more on the feelings of the actors; that is why it is particularly appropriate for younger ages.

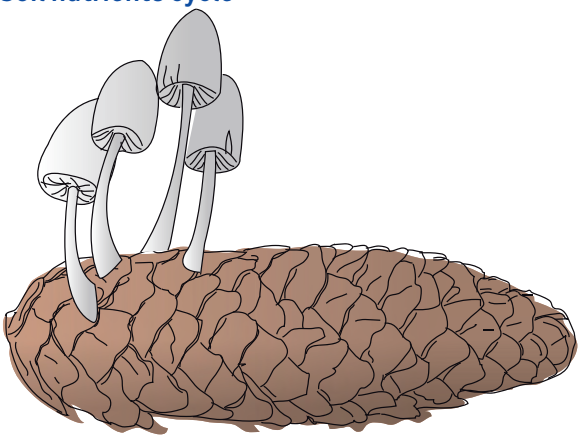
1. Seed dispersal



2. Soil nutrients cycle

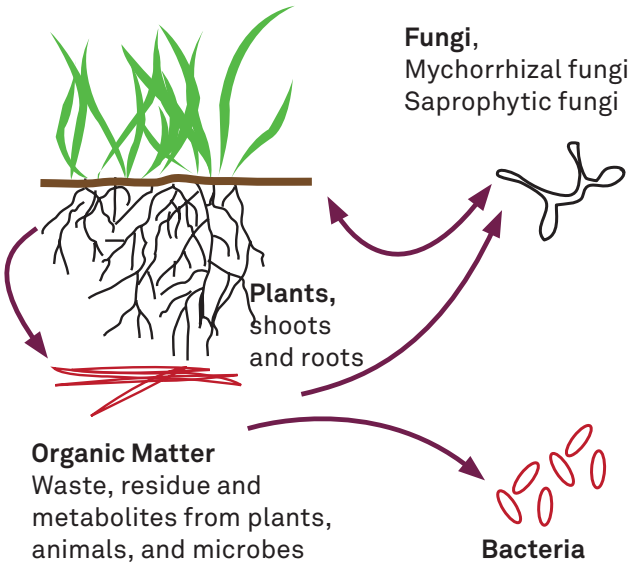


3. Soil nutrients cycle



What will happen
if one of theses species disappear?
Can we role-play it?

4. Soil nutrients regeneration



5. Plant germination

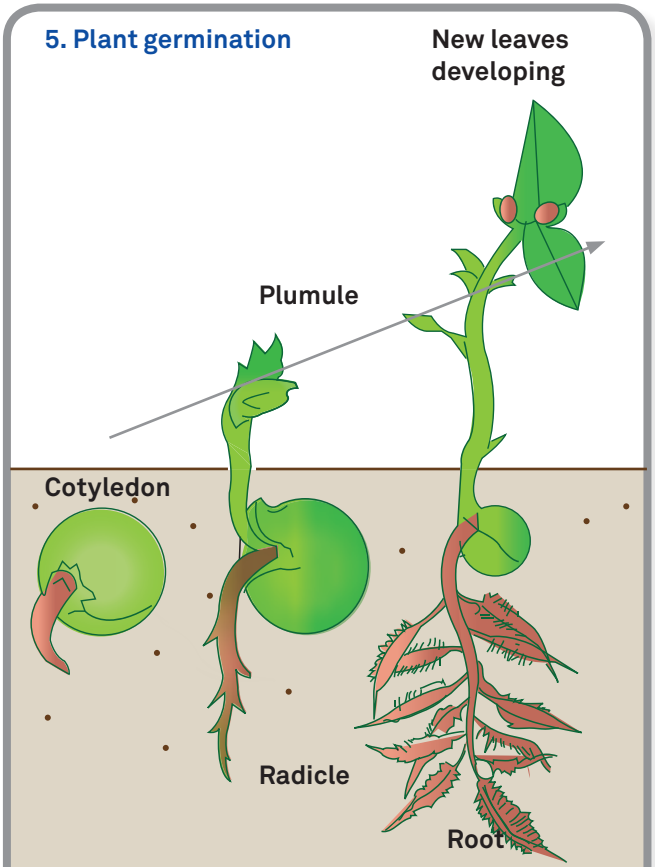


Table 30
A proposed "ecosystem drama" investigating the consequences of a species' disappear in the food web
(adapted from Gille H., 2008)

STEP 1: Working in groups, the learners choose a species of the ecosystem (plant, animal or insect), whose characteristics they have already studied in previous activities. The ESD educator help them choose a species that carries out several functions with the ecosystem (food chain functions, plant germination, seed dispersal, pollination, replenishing of soil nutrients). These species will exemplify several types of interdependence with others: mutual dependencies without which the ecosystem would not be the same.
STEP 2: In plenary, learners discuss what will happen if the species disappears. They visualise and describe the sequence of events. ESD educator's role is to get the progression of the ideas heard on track if necessary. Learners write synopsis of their chosen scenarios.
STEP 3: In groups learners work out a sketch based on a synopsis preparing signboards, if needed. The acting group mimes the situation, using the signboards now and then to clarify who they represent (we are omnivorous birds) or what is happening in their environment (i.e. the drought continues, pesticides pollute the soil, etc.). The groups perform in turn, the rest acting as an audience.

Example scenario n° 1:
What would happen in the Sahel if dung-beetles or other scarabs disappeared?
These organisms play an essential role in the nutrient renewal cycle that keeps the soil fertile in the dry Sahelian savannah. If they were to disappear they would no longer recycle the huge quantities of excrement left by big herbivores or domestic livestock, crumbling and separating out the coarse droppings on which they feed... They would not prepare this organic matter for its final decomposition by micro organisms and decomposers, leading in the end to the assimilation of the nutritious mineral elements by the ecosystem.

Example scenario n° 2:
What if the ants disappeared from the Mediterranean bush landscapes?
The ants would no longer play their part in regenerating the soil by concentrating nutrients in particular locations. i.e they carry chewed and regurgitated leaves to their fungus beds to provide ideal compost for fungi to grow... They would therefore no longer promote the growth of fungi, nor would there be compost in these particular areas to be broken down by decomposers (including fungi), which recycle the nutrients contained in dead matter by realising mineral elements (nitrogen phosphorus, magnesium, potassium) into the soil... Ants' nets would no longer provide sites for the rapid succession of vegetation from grasses or succulent plants to woody plants. The equilibrium of the ecosystem would be under threat ...

The action takes place in three scenes:

Scene 1: The actors begin by demonstrating how the morphology and behaviour of a particular species are finely-tuned and well adapted to the harsh conditions of the arid ecosystem. The pupils may mime situations involving species they know and they improvise by bringing into the sketch what they have previously learned.

Scene 2: The learners explain to the audience that the species is endangered or dying out.

Scene 3: The actors mime the sequence of effects that follows the disappearance of the species. In this way some of the pupils' observations are made clearer: If the species in question is eaten by many other species, then the consequences of its disappearance are greater than if it is only eaten by only one, because several other species will in turn become scarce or disappear altogether. Specialised organisms which only eat one kind of food, like larvae that are dependent on succulent plants, are under greater pressure than those with a varied died such as omnivorous birds. Depending on the situation, the learners act out the behavioural differences between one species and another.
Finally they act out the impact of the species' disappearance on the ecological functions which are no longer there: Whatever the characteristics, all species are indispensable. They perform functions that originate from the interactions between species (i.e regulation of population size, seed dispersal) and provide valuable services for the smooth functioning of the ecosystem. Humans cannot replace these functions when species disappear: the learners will be acting out the disappearance of some vital ecological functions They portray i.e. the invasion of pests in the absence of predators; the decline in pollination by bees; the lack of maintenance of soil fertility, normally carried out by ants; floods and strong winds that are no longer held back by trees and bushes with their deep roots and their foliage –such as the wild olive, cypress and holm oak in the Mediterranean ecosystem).

Making a video (source: **www.medias.net**)**:**
This technique is quite simple and can be adjusted to many contexts.
The process followed is the following: While in the field the learners collect materials for their videos (scenery). Back in class, guided by the educator, they brainstorm on a common issue; they create the scenario; they set up their scenery (using their collected materials); and they develop the main characters. Then they take photos of the subsequent scenes and using the laptop/PC, they collate them to create a video animation telling their story. They record their voices as sound.

8.12 Problem based learning

Problem based learning (PBL) is a student-centred educational problem solving method. Problem solving has its roots in the 1970's when environmental awareness was closely linked to building public awareness on intense environmental problems that eventually led to ecological crises including pollution, depletion of natural resources, desertification etc. Later, in the 1980s, Environmental Education was oriented towards looking at the basic causes of the ecological crisis which included overpopulation, excessive consumerism, faulty economic and development indicators and the lack of proper education (Scoullos, 1987). The importance given to finding solutions was reflected in the field of education by focussing on the teaching and learning process of problem solving.

PBL also has its roots in the field of educational science: John Dewey envisioned the school as a miniature democratic society and placed the educational foundations of direct experience, participation and action. Participation of individuals in resolving problems demands a shift from teacher-centred to experiential, participatory student-centred approaches.

What is an environmental problem?
Every change in the environment does not necessarily mean an environmental problem. A change in the environment can be positive, negative or neutral and can be due to natural causes or human influences. An environmental problem is a change that threatens the environment. Or there is evidence indicating that it may threaten the environment now or in the near future including the quality and well-being of the environment and man. A critical question on whether a change is positive or negative is "for whom" as well as "when" (e.g. today, ten years from now, etc.)

In using PBL learners acquire life long learning skills such as the ability to find and use appropriate learning resources. Additionally, research shows that this method develops four skill categories (UNESCO, 2002):
- Group working: Listening and understanding the ideas of others, expressing their own ideas, exchanging ideas, making decisions, using their time wisely, etc.
- Data collecting: Using reference materials, designing and implementing ways of finding information on their topic (surveys, polls, experiments, research etc.) writing and sending letters requesting information, etc.
- Decision making: Analyzing information collected, clarifying their values and those of others, identifying alternate choices/approaches of an issue, deciding on action and supporting their decisions, etc.
- Action evaluating: Deciding on the steps of an action plan, choosing freely to take action, evaluating whether any changes are the result of their actions, addressing problems.

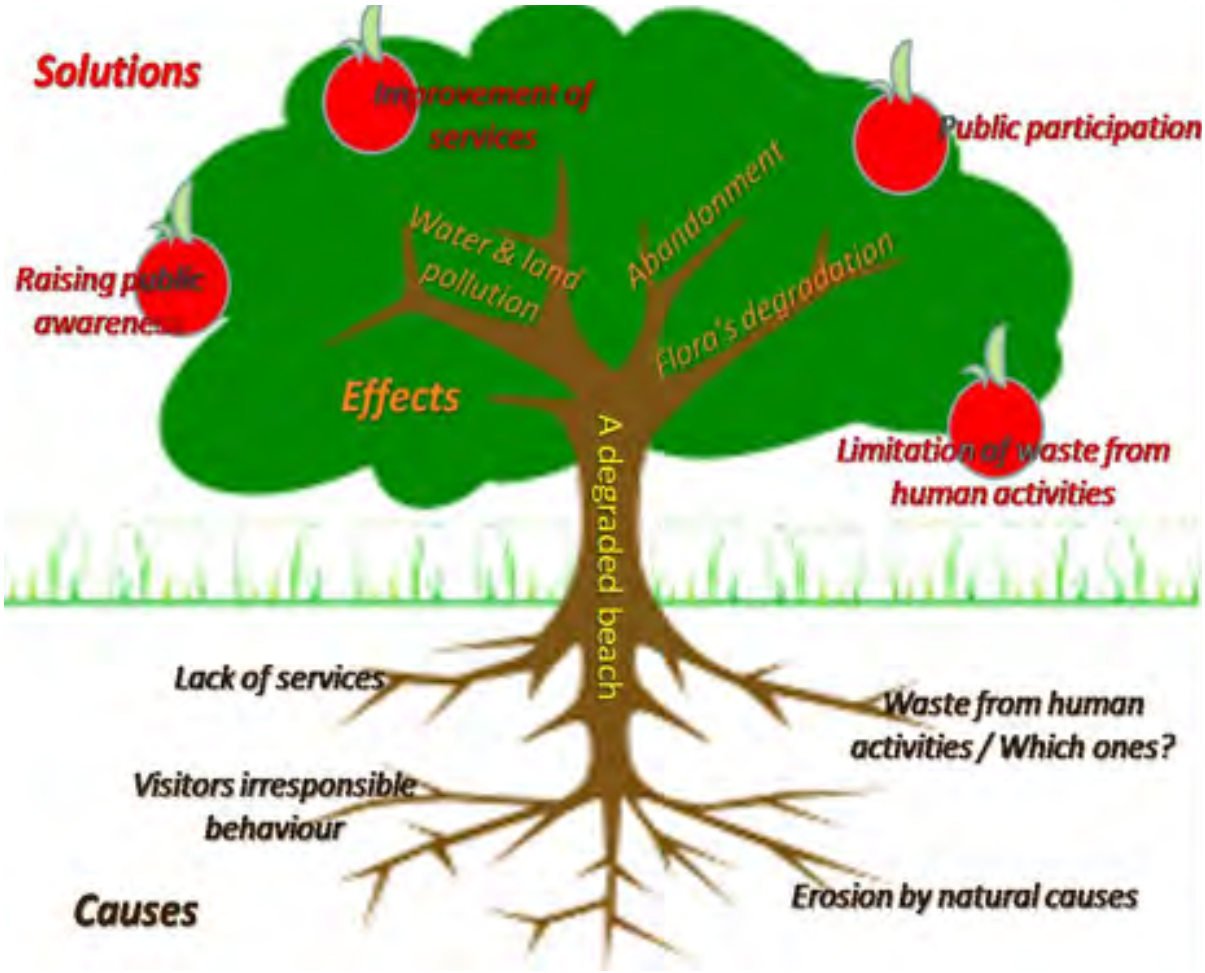
Some academic theorists and educators have expressed misgivings on the method of PBL, with particular criticism on the student's involvement in such practices claiming that this goes beyond the learner's and educator's ability (Papadimitriou, 2002). However, the pedagogical value of PBL lies primarily in its methodology and not in the actual solving of a problem. For example, a group of students studying atmospheric pollution in a given area, it is not expected that they actually solve the problem. Of course, the approach to the problem should be based on correct data and proposed solutions should be realistic, and not be oversimplified or frivolous.

Nevertheless, experience gained through the participation in the process contributes positively to developing responsible behaviours, making decisions and mobilizing people all have great pedagogical significance. A learners' group participating in such a programme can potentially act as an instrument for awareness of the wider, general population but also a core for the specific mobilization of the local community. In using the PBL it is important to draw on a specific subject so that the team can respond within a set time frame. For example, "water pollution" or "species extinction" are too general. While a subject such as "the reasons for the extinction of many species of fish in our area's stream" is clear and more specific and can lead the team to outcomes.

UNESCO (2002) suggests that the issues/topics of PBL should be:
• Of a local nature.
• Within the group's capacity.
• Within the time and resources that are available.
• A real need, particularly for the local community.
• Important to the group: participants show greater involvement when they have chosen the topic themselves.

PBL is characterised as the "umbrella method" as well because it incorporates a variety of techniques and activities, e.g. team work, discussion, field activities, research and polls, etc (Scoullos and Malotidi, 2004). Many different methodologies have been developed for PBL in the EE/ESD context, the main one emphasising to action. An example of PBL based on the method's general context follows (Stone, 2005; UNESCO, 2002). Of course, it is not obligatory to strictly follow the steps, for example, if a group of students has already implemented a similar programme in the past, the ESD educator can skip i.e. the analytical evaluation step. In addition, it is reasonable to expect that the suggested work plan can be covered in an ESD programme that includes several meetings between the educator and the team of participants. However, PBL can be implemented in a shorter time period e.g. in a two-hour meeting. For example, a team can work on an issue using information based on a current newspaper article which has been evaluated by the educator. Of course, the steps below can be followed in this case as well: investigating and analyzing causes of the problem, identifying and evaluating possible solutions etc.

Figure 26
The problem Tree (adapted from OXFAM, 2006)



This is a tool to encourage participants (children, adults) to explore the causes, effects and solutions of an issue in the framework of the PBL. Participants draw a fruit tree in a large piece of paper.
They then label the trunk with the name of the issue; the roots with the causes of the issue; the branches with the effects and, the fruits with the possible solutions.

The activity can be carried out either before participants' research (formative assessment of what they know already) or during the PBL filling in gradually the various parts of the problem Tree.

Table 31
The "problems" of a beach

- **1. Defining the problem**. At this stage, the problem students will be working on, is identified. The issue can be chosen spontaneously, if it is a "visible" problem of concern to the local community or through the group's research of the area or even a relative proposal by the ESD educator; e.g. in this case, the subject is the improvement of a local beach, which is in poor condition and has pollution problems due to erosion, threats to vegetation's biodiversity, (dunes) and neglect.

2. Formative "assessment". This stage refers to identifying the group's skills and particularly those that are necessary to the implementation of the activity; e.g. if the subject the group is working on necessitates a survey, then the group needs to have practiced this technique beforehand. Also, the team discuss their ideas, knowledge, information and experiences that are relative to the subject.

3. Analyzing the problem. During the analysis, the team must answer the following: What are the causes of the problem? Which social groups are involved? What are the interests and values of the above groups? What are the causes of the problem? The group in this example is called upon to answer:
What is the beach's condition? In order to develop a complete picture of the situation, the team may use a variety of techniques such as field visits, observation and documentation, photographs, interviews by visitors, residents etc. Participants must determine how significant the area's problems really are: for each personally, for the local community, for the country. This can be accomplished by using brainstorming sessions, discussions with local groups and experts, etc.
What are the causes of this situation? For example, the lack of waste bins and services involved in maintaining the cleanliness of the beach? Or is it visitors' behaviours? Perhaps production activities that impact on the environment, dumping waste, for example?
Who is involved in this situation and in what way? The group is called upon to identify those involved such as governmental and municipal authorities, professionals who act in the area, residence who are responsible for the beach's present condition? In other words, in what way do they act and/or "use" the area and what are the consequences of their actions?
What are the consequences of the beach's poor condition? For example, how is the ecosystem, tourism, fishing, the aesthetic and quality of life affected?

- **4. Identifying and assessing possible solutions.** The group proposes solutions, records the advantages and disadvantages, rates and decides on the best possible solutions. For example "critical questions" that need to be addressed are the following:
• Who can do something? The state? Local bodies? Citizens? The Environmental Information Centre? Schools? Professional associations (e.g. professional tourism or fishing associations)?
• What actions can be taken? Cleaning the beach? Informing the public? Systematically cleaning the areas? Cordoning off areas with plants and other organisms in need of protection? Signs? Changes in practices by professionals working in the area (e.g. limiting pollution they cause)? Coordination of all those involved through meetings, information exchange and common actions? Identifying funding?
• To what degree do the above actions make a difference and what is the time frame e.g. cleaning the beach can only directly improve the situation in the short term, etc.
• Are the actions feasible?
• Who benefits from these actions?

5. Designing and implementing actions for solution. The group acts according to the solution they have chosen. But first they must inform any bodies or individuals that may be involved. By interacting and cooperating with those who are involved, it may be necessary to include other actions or to reconsider those that have been selected in the previous stage (more on the design and taking action in the respective chapter). One technique for identifying and ranking possible solutions and making common decisions on action plans that the team will recommend is the following:
1. Each one notes possible solutions to the problem and ranks them.
2. In pairs, discuss ideas and write down four proposals identified and ranked together.
3. In groups of four, they repeat step (2) and come upon with four proposals.
4. The solutions proposed are posted on a wall or board so that they are visible to all.
5. In plenary participants compare proposals and decide on the best possible solution plan.

6. Evaluating the process. At the end of the programme and based on the objectives set at the beginning of the programme, the group may reflect - individually and collectively- on the following points:
What was the contribution of each person separately?
Did everyone have an active role?
What else could have been done? Who else could have contributed?
Was the problem solved? To what degree?

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92. Pollution of the coastal marsh, *Port of Huelva*, Spain
© UNESCO / O. Brestin

93 - 94. Litter accumulating on the beach, *Antalya beach* in winter, Turkey
©Philippe Pypaert

◀ (cf. P.226) **1. Defining the problem**

◀ (cf. P.226) **4. Identifying and assessing possible solutions**

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95. Dustbins put in place on the beach, *Marismas del Odiel BR*, Spain
© UNESCO / O. Brestin

96 - 97. Information panel indicating a fenced plant conservation area, *Marismas del Odiel BR*, Spain
© UNESCO / O. Brestin

98. Wooden footpath for circulation in the conservation area, *Marismas del Odiel BR*, Spain
© UNESCO / O. Brestin

99. Conservation zone protected from the beach and the seaside area, *Marismas del Odiel BR*, Spain
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8.13 Participatory processes and methods for improving citizenship

What influences the intention to act

According to research on models for predicting behaviour, for someone to demonstrate a responsible behaviour towards an issue, it is not enough to be informed or familiar with it. According to the prevailing models[10], the factors that influence individuals to exhibit (or not) a sustainable pattern of behaviour, include, among others, people' attitudes towards the issues, knowledge of ways of action, degree of mastery of the action-taking skills, and, personality factors, i.e. the **Locus of Control** (LoC). According to research, those who have an internal "locus of control" in other words give priority to personal action and not to external factors in dealing with situations; usually display responsible environmental behaviour in comparison to those who seem to have a corresponding "external" locus of control (Franson & Garling, 1999).

Locus of control (LoC) refers to how much control over a situation an individual considers to have. It is understood as continuum having two poles: external LoC and internal LoC. External refers to the belief that outcomes are controlled by outside forces, while internal corresponds to the belief that people themselves exert control over a given situation.

Whatever the case, educators aiming to shift learners' behaviour towards sustainable patterns e.g. to opt for local fresh products from their neighboring designated area , should keep in mind that there are many parameters influencing the intention of behavioural expression and interacting in a complex way. Even if the intention to act is favourable, the actual demonstration may be restrained by uncontrollable factors and external conditions e.g. the absence such products in their near by supermarket.

Suggested activity for exploration of the profile of the responsible citizen (adapted from **www.actionaid.gr**)
A learner lies down on a 2mx1m long paper and the group makes an outline of his body, giving the title "the responsible citizen". The group is asked to write in post it papers, individually, the characteristics they consider important for the responsible citizen to deal with the global and local problems (these can be physical, social, a trait of character, a code of behaviour, etc). E.g. a responsible citizen needs to be informed so to inform his co-citizens. A collage gradually forms, and is categorised in plenary, with the help of the educator. By the end the learners are asked to place their post it papers to the referring organ of the body: e.g. what in the legs they place the solid foundation of the citizen, in the heart they place the attitudes, in the head the knowledge and so on.

Basic action strategies

Hungerford's team classified four types of environmental actions as follows (Hungerford et al., 1994b):
A. Persuasion: Is the logical or emotional appeal to others so that they either adjust their attitudes or take action. It may come from an individual or a group and is exercised primarily through discussion. In order to convince others of the value of a BR or a designated area, they may discuss the subject with family or friends, or they may publish an article in the local paper, they may create and distribute posters and information pamphlets, they may organize public awareness events such as speeches, exhibitions, excursions, concerts, bazaars with products from the area, etc.

10. The prevailing models for predicting environmentally responsible behaviour are presented in the Annex.

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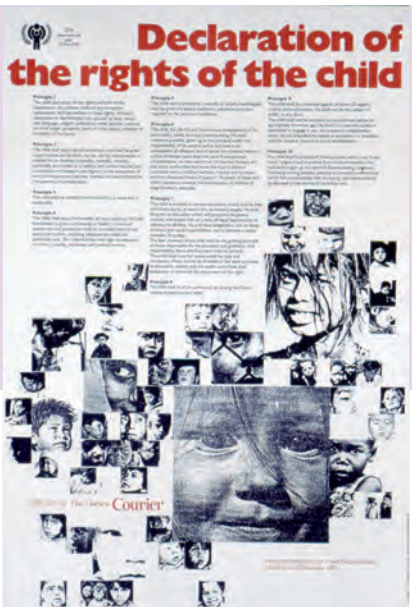
100. Anti-nuclear demonstration, *Paris*, France
© UNESCO / Misato Le Mignon



101. Poster of the *Declaration of the rights of the child*, UNESCO headquarters, France
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102. Post-it note brainstorming session on the moral values in sport, © UNESCO / Michel Ravassard

103. *BNP Paribas Cup* under the auspices of UNESCO, gathering 300 international tennis players, © UNESCO / Michel Ravassard

B. Responsible consumer behaviour: This basically refers to individuals' buying power and to adopting consumer behaviours that are in line with sustainable consumption patterns, for example, opting for products in recyclable/recycled/packaging, or with no packaging, having been produced according to environmental standards, ISO, etc.; choosing fresh local products instead of the ones which came from far away; supporting the fair trade initiatives; refusing to buy (boycott) products that have been produced by child labour or by companies conducting animal experiments or companies/corporations that have a negative environmental impact, etc.

C. Political action: This refers to exerting pressure on governmental and local authorities (lobbying) in order to persuade them to take responsible action. For example, voting for candidates with a proven interest on sustainability topics and issues, promoting sustainability topics to the local board of authorities; undertaking legal actions, such as lawsuit, charges for cases of uncontrolled interventions in a BR, taking part in public hearings, demonstrations, internet discussions (blogs, forums, etc.).

D. Eco-management: refers to actions respectful to the environment and are based on the principles of sustainable development. It can be implemented individually or in groups and contributes to the overall improvement in the quality of life. For example actions may include the restoration of a degraded coastal special designated area, recycling systematically, composting on an ESD Centre or Information Centre grounds, volunteering for an environmental organisation, etc. These environmentally-friendly actions vary depending on age, personality and individual characteristics (e.g. persons with disabilities).

Studies on secondary school students show that those who knew how to take action and had the relevant experiences and skills, showed greater participation in resolving environmental issues than those who were limited to having only the cognitive knowledge of these issues. In fact, these students continued to apply those skills even after the programmes ended. Finally, it appears that those who have already taken effective environmental action at least once are more likely to take action again (Kamarinou, 2005).

The ESD educator should support and encourage the group even when for some reason the action is not completed or if the group is disappointed by the course the action has taken. For example, if an action plan focuses on the restoration of a stream in a BR and includes the eradication of hazardous waste, the group should bear in mind that a complete restoration may take years. It is important for the group to be involved in realistic and feasible after being decided by the learners themselves rather than following an action that has been pre-designed (by the educator) (Hungerford et al.,1994a).

Table 32
The Action plan: the ESD educator and the group can make an action plan, which there are going to use in negotiating, assessing, analysing the forms of action

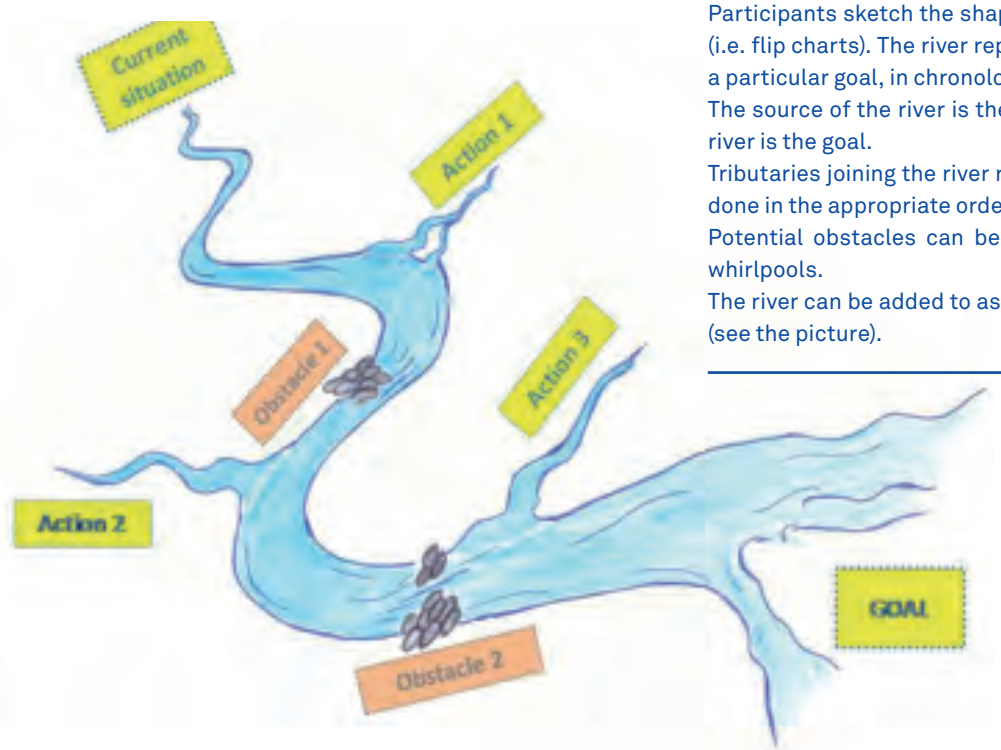
(A) In the first phase they should answer questions such as the following:
- What is the target and what is the expected outcome of the action?
- Is the action realistic and appropriate?
- What are the consequences of the action (legal, social, financial, ecological)?
- What are the anticipated obstacles?
- What are the alternatives?
- Are the values of the group in accordance with the action?
- Who else needs to participate? How? Why?

(B) In the second phase, the group announces the planned action to the involved stakeholders, and finalises the action plan after negotiation with them. Related questions to answer in this phase include:
- Is a special license/permission necessary e.g. for signs?
- Is the action plan sufficiently detailed?
- Do all participants understand the action plan and their role in it?
- Do we expect problems or resistances/obstacles for the action?
If yes, how can we deal with them?

(C) Then, the group proceeds with the action and in the meantime makes any necessary changes in order to enhance its effectiveness.

(D) When the action is completed, the group needs to rethink the action regarding:
- How do the members of the group feel after the experience?
- Were the objectives met?
- Were there any unforeseen outcomes, positive or negative?
- What does each member feel he/she gained from taking part?
- What was the reaction of those affected by the action?
- What was the impact on the local society?
- Did all group members successfully participate?
- Were there any communication problems among the stakeholders? Why?

Figure 27
The river timeline



River time line (adapted from OXFAM, 2006)
This is an action planning tool to help learners chart progress towards a goal.
Participants sketch the shape of a river on a large piece of paper (i.e. flip charts). The river represents the steps towards achieving a particular goal, in chronological order.
The source of the river is the situation now and the mouth of the river is the goal.
Tributaries joining the river represent the actions that need to be done in the appropriate order.
Potential obstacles can be shown as boulders, waterfalls and whirlpools.
The river can be added to as progress towards the goal continues (see the picture).