NETZWERK SCHWEIZER PÄRKE
RESEAU DES PARCS SUISSES
RETE DEI PARCHI SVIZZERI
RAIT DALS PARCS SVIZZERS

alparc

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Office for the Environment FOEN

ALPARC's working group "Environmental performance evaluation and ecological balance"

The working group and the reasons for its establishment

Parco delle Orobie Valtellinesi

Claudio La Ragione - Direttore del Parco delle Orobie Valtellinesi

WORKSHOP "Indicators of management effectiveness" 16-18th of March 2011 Entlebuch - Switzerland

The origins of the working group

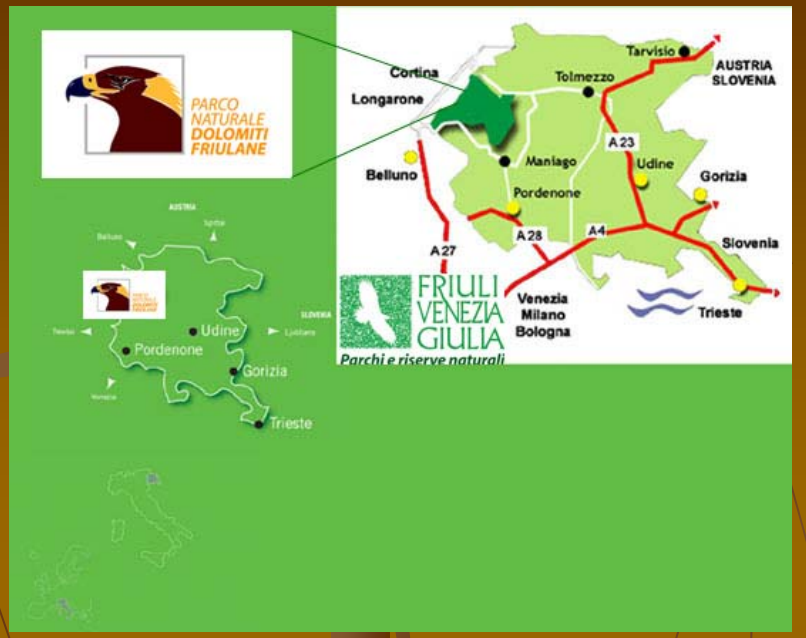
- The working group was born in Bled, in the year 2008, during ALPARC assembly
- was proposed by parks Prealpi Giulie, Dolomiti Friulane and Orobie Valtellinesi
- Three alpine italians parks have felt the need to an instrument to assess the value of ecosystem services of the mountain
- Probably the need for such assessment tool is greater in those regions that have both plain and mountain areas, with imbalances between the supply of ecosystem services (from mountains to the plains) and the poor returns on financial flows to areas providing services

PARCO NATURALE DOLOMITI FRIULANE

UNESCO

PATRIMONIO MUNDIAL · WORLD HERITAGE · PATRIMOINE MONDIAL

PARCO NATURALE REGIONALE DELLE DOLOMITI FRIULANE



The Park is located in the mountainous area overlooking the upper Friuli-Veneto plain.

Protected area extends from the Province of Pordenone to the Province of Udine and embraces Valcellina, the upper Tagliamento River valley and the territories converging towards Val Tramontina

The Forra del Cellina Ravine Regional Wildlife Reserve - the spectacular gorge that the Torrente Cellina Stream carves into the layers of limestone between Barcis, Andreis and Montereale Valcellina before reaching the upper Friuli plain - borders the Park and is managed by the same Administrative Body.

The municipalities within Park territory are:

Comuni di Andreis (pn), Cimolais (pn), Claut (pn), Erto e Casso (pn), Forni di Sopra (ud), Forni di Sotto (ud), Frisanco (pn), Tramonti di Sopra (pn).

PARCO NATURALE DOLOMITI FRIULANE

UNESCO

PATRIMONIO MUNDIAL · WORLD HERITAGE · PATRIMOINE MONDIAL

THE FAUNA

Thanks above all to the environmental diversity of this mountainous - alpine belt and the scarce human presence in th territory, the Friuli Dolomiti Alps Natural Park offers an exceptionally rich heritage of fauna.

The Park features stable populations of chamois, roe deer, marmots, wood grouses, black grouses, deer, and an alrea established and steadily growing herd of steenboks.

The Park's degree of freedom from contamination and wilderness is illustrated by the density of population of the golde eagle, and one nesting pair in each valley has been estimated.

PARCO NATURALE DOLOMITI FRIULANE

UNESCO

PATRIMONIO MUNDIAL · WORLD HERITAGE · PATRIMOINE MONDIAL

THE FLORA

The richness of the flora ensures the presence of rare and protected species, such as the beautiful Cypripedium calceolu the Campanula morettiana, and numerous orchids and gentian.

There are also authentic endemics, created in ancient times and survived in isolated areas. Among them, the Carn sandwort (Arenaria huteri Kerner), the Karawanken Gentian (Gentiana froelichii), the Devil's Claw (Physoplexis comosa the Daphne blagayana.

AREAS OF SPECIAL INTEREST

The Park contains numerous areas of special interest that narrate the history of the territory and distinguish th environment.
The list below provides a useful outline for visitors interested in discovery.

- Valcellina (Andreis, Cimolais, Claut, Erto e Casso)
- Val Meduna (Frisanco, Tramonti di Sopra)
- Val Tagliamento (Forni di Sopra, Forni di Sotto)

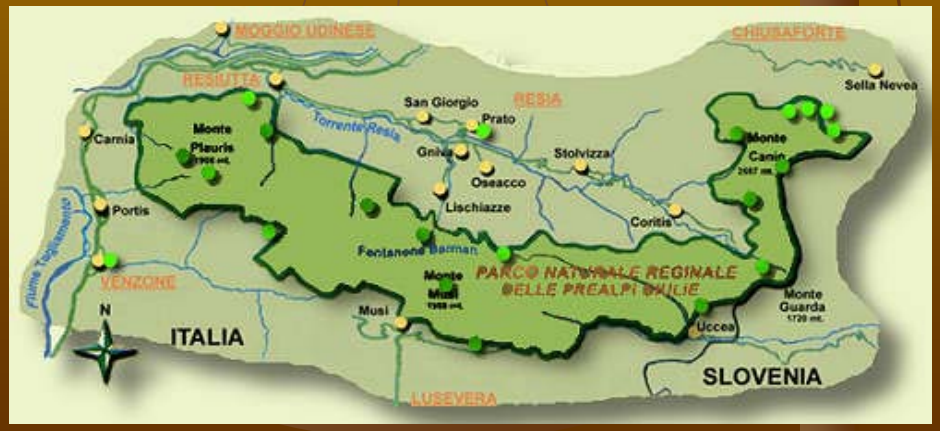
More info: http://www.parcodolomitifriulane.it/

PARCO NATURALE PREALPI GIULIE

PARCO NATURALE PREALPI GIULIE

The Julian Prealps Nature Park was set up in 1996 and is extended in an area of about 100 km² and comprises territories in the municipality of Chiusaforte, Lusevera, Moggio Udinese, Resia, Resiutta and Venzone in the Province of Udine. The Nature Park includes the highest parts of M. Plauris (m 1958), of M. Musi (m 1869) and of M. Canin (m 2587) and low levels (or altitudes) in the area of the village Povici in Resiutta and the valley Valle del Torrente Mea in Lusevera.

The specificity of this area, due to the contact of three different biogeographic areas: Mediterranean, Illyrian and Alpi one, have caused an extraordinary biodiversity.



PARCO NATURALE PREALPI GIULIE

THE FAUNA

In the Park area there is a cohabitation of elements of wild life of Mediterranean, circum-Mediterranean and Oriental origin. All the Alpine ungulates are present in the area (roebuck, deer, chamois, steinbock and wild boar) as well as important Mammalia such as the wild cat, different species of Mustelidae, Rodents and Insectivores.

In the last years the presence of the brown bear and of the lynx has been confirmed by numerous reports of tracks and sightings in the Val di Uccea, Val di Musi and Val Venzonassa.

There are quite a good few birds in the Park, 100 species, 89 of nest-building birds and 11 nest probably. There are quite a few birds of prey (eagle owl, tawny owl, Tengmalm's owl, golden eagle, goshawk, buzzard, griffon), all the Teatronidis (capercaillie, black grouse, snow-grouse, hazel hen) and different species of Corvidae, Picidae and various passerines.

The Greek partridge is the symbol of the Nature Park of the Julian Prealps and it mostly inhabits the suited southern slopes of the mountains.

The Amphibia, Reptilia and Insecta also find in the variability of the Park area the ideal life conditions. They arouse the interest of researchers and passionate excursionist.

PARCO NATURALE PREALPI GIULIE

GEOLOGY

The evolution of the Alpine Region during the last million years has caracterised the area of the Parc approaching features of glacial and river morphology in the very little space.

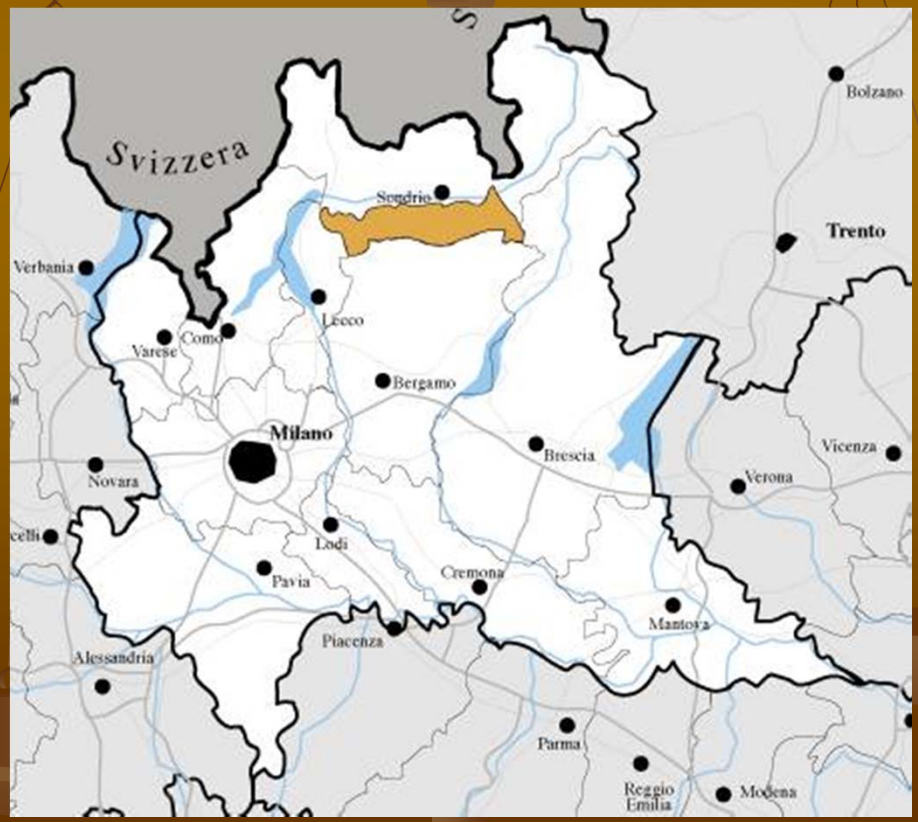
In the upper side of the valleys are still visible examples of glacial arcs, still perfectly preserved. In the northern part of the peak of M. Canin there is a tiny piece of glacier. Drops in the river bottoms are quite common, creating spectacular rapids and waterfalls. The falls of Fontanone Rio Barman and Fontanone Goriuda are particularly imposing. The maximum development of the karst morphology is on the plateau of Foran del Muss, at the foot of M. Canin. All the karst phenomena are represented here, both on the surface and underground, creating a real karst garten; they are particulary intense near the Col delle Erbe, where the largest cavities in the area are to be found. They are over 1000 meters deep.

More info: http://www.parcoprealpigiulie.org

Parco delle Orobie Valtellinesi

- The Valtellina Orobie Mountains Park is in Lombardy, on the Valtellina side of the Orobie Alps

- The Valtellina Orobie Mountains Park is on the side of the mountains which lies in the province of Sondrio, covering a territory of 44.000 hectars mainly above 1,000 metres (3,000 feet), bounded to the west by the watershed of Monte Legnone and to the east by the Aprica Pass.

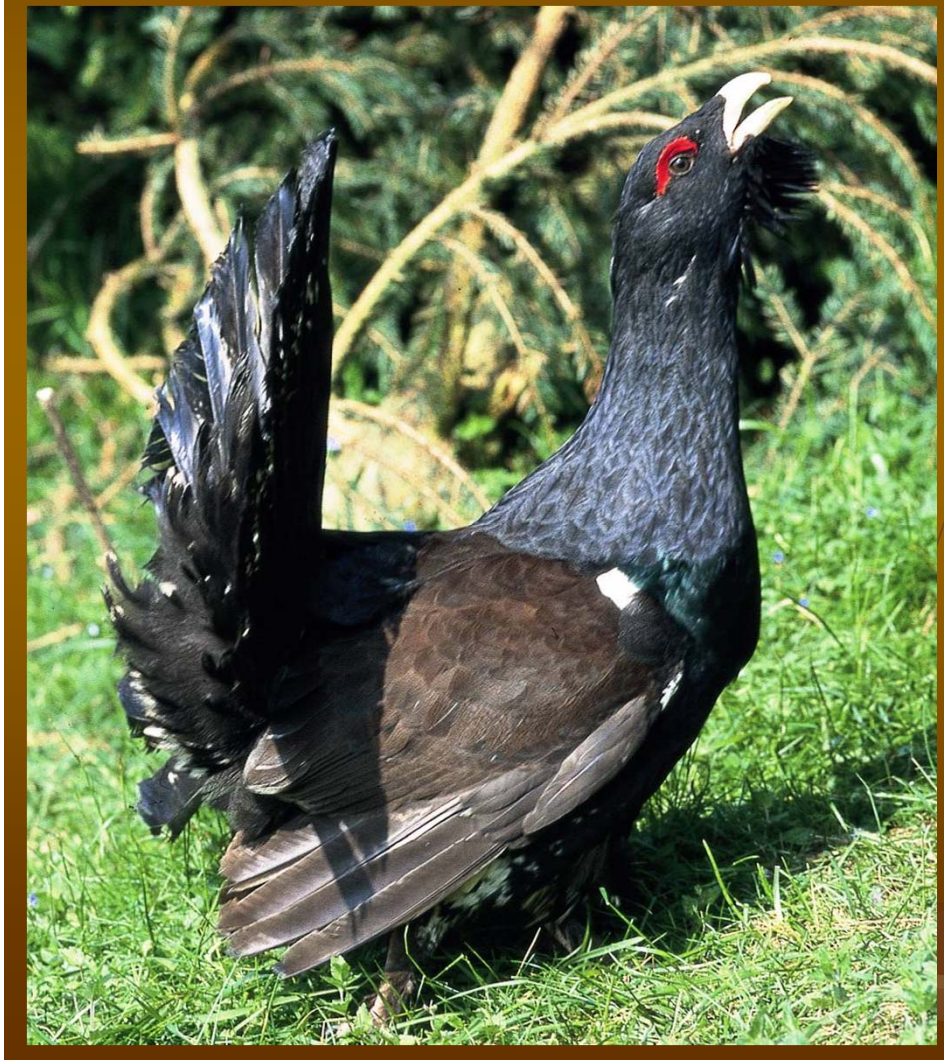


Parco delle Orobie Valtellinesi

- The endemic plants Sanguisorba dodecandra e Viola comollia

Parco delle Orobie Valtellinesi

- The Animals

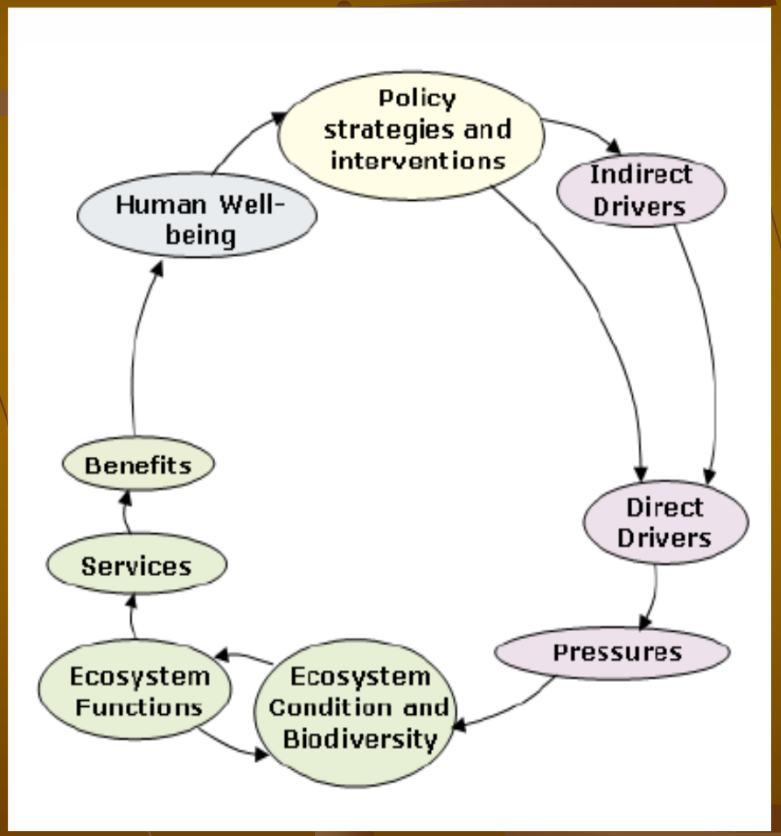


Parco delle Orobie Valtellinesi

- The history and the traditions

The value of ecosystem services

- Ecosystem services are broadly defined as the benefits provided by ecosystems to humans; they contribute to making human life both possible and worth living (Daily 1997; MA 2003). Biodiversity affects numerous ecosystem services, both indirectly and directly. Some ecosystem processes confer direct benefits on humanity, but many of them confer benefits primarily via indirect interactions.
- Human well-being and long-term economic success depend on ecosystem services, the benefits that people get from nature.



What are ecosystem services

- Humankind benefits from a multitude of resources and processes that are supplied by natural ecosystems. Collectively, these benefits are known as **ecosystem services** and include products like clean drinking water and processes such as the decomposition of wastes. While scientists and environmentalists have discussed ecosystem services for decades, these services were popularized and their definitions formalized by the United Nations 2004 Millennium Ecosystem Assessment (MA), a four-year study involving more than 1300 scientists worldwide. This grouped ecosystem services into four broad categories: *provisioning*, such as the production of food and water; *regulating*, such as the control of climate and disease; *supporting*, such as nutrient cycles and crop pollination; and *cultural*, such as spiritual and recreational benefits.

- The Millennium Ecosystem Assessment established a benchmark. Efforts such as those by The Natural Capital Project on valuation (Natural Capital Project 2007), IUCN on payments (IUCN 2006), and the World Resources Institute on mainstreaming ecosystem services in public and private sector decisions provide new methods that decision makers can use to make the links between ecosystems and development. As we are better able to describe and value the benefits of ecosystem services, decision makers can better understand how their actions might change these services, consider the trade-offs among options, and choose policies that sustain services.
- The economic evaluation of the environment helps decision-makers to integrate into the decision-making process the value of environmental services provided by ecosystems.
- Ecosystem services *valuation* can help to justify protected areas policy, identify funding and investment opportunities, and inform conservation priorities.

The Economics of Ecosystems and Biodiversity (TEEB)

- In 2007, environment ministers from the governments of the G8+5 countries, meeting in Potsdam, Germany, agreed to “initiate the process of analysing the global economic benefit of biological diversity, the costs of the loss of biodiversity and the failure to take protective measures versus the costs of effective conservation.”
- The Economics of Ecosystems and Biodiversity (TEEB) study, which emerged from that decision, has delivered a series of reports addressing the needs of major user groups: national and local decision makers, business and the wider public.

The G8+5 includes the heads of government from the G8 nations (Canada, France, Germany, Italy, Japan, Russia, the United Kingdom and the United States), plus the heads of government of five emerging economies (Brazil, China, India, Mexico and South Africa)

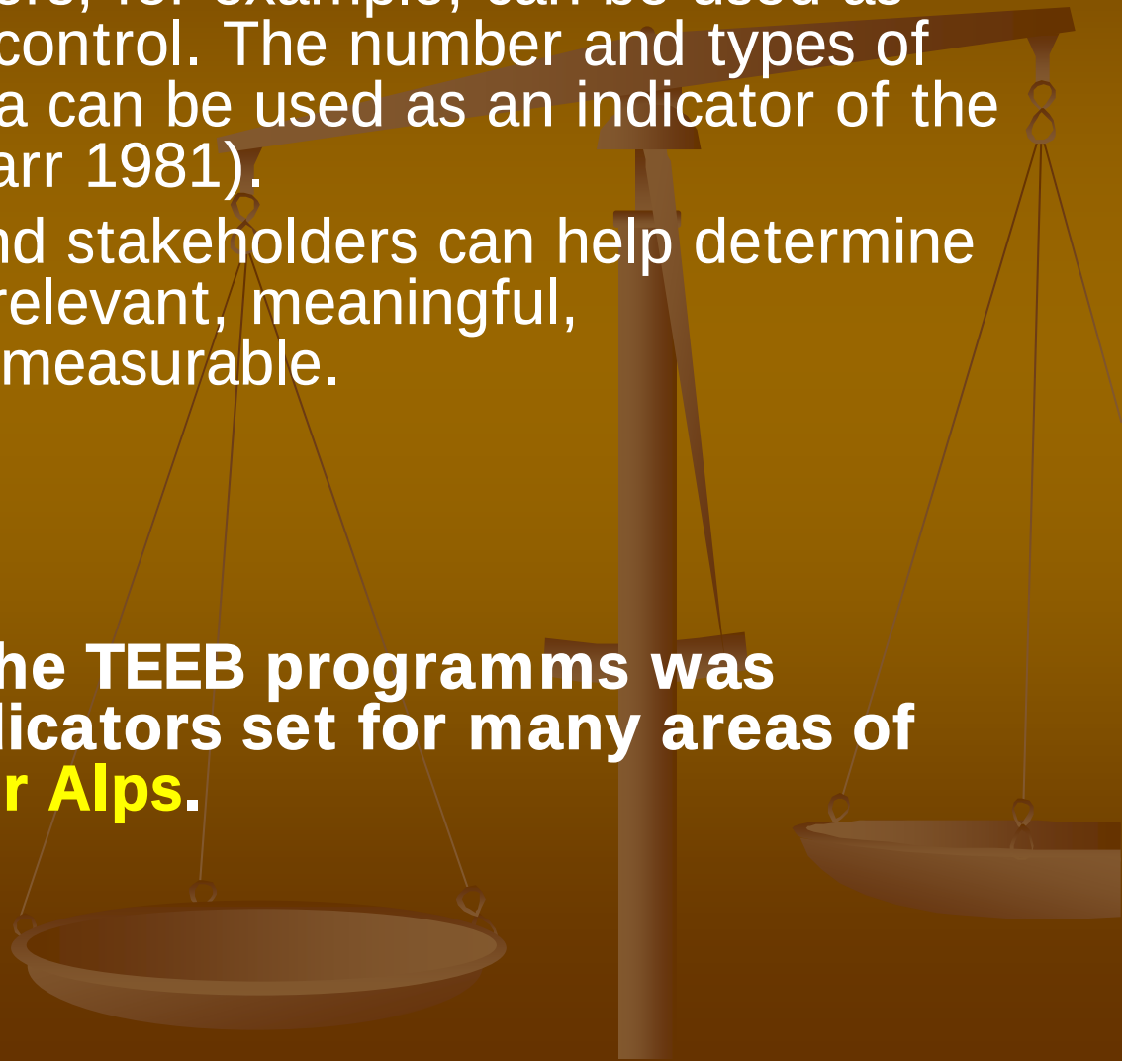
- **Provisioning Services** are ecosystem services that describe the material outputs from ecosystems. They include food, water and other resources.
  - **Food:** Ecosystems provide the conditions for growing food – in wild habitats and in managed agro-ecosystems.
  - **Raw materials:** Ecosystems provide a great diversity of materials for construction and fuel.
  - **Fresh water:** Ecosystems provide surface and groundwater.
  - **Medicinal resources:** Many plants are used as traditional medicines and as input for the pharmaceutical industry.
- **Regulating Services** are the services that ecosystems provide by acting as regulators eg regulating the quality of air and soil or by providing flood and disease control.
  - **Local climate and air quality regulation:** Trees provide shade and remove pollutants from the atmosphere. Forests influence rainfall.
  - **Carbon sequestration and storage:** As trees and plants grow, they remove carbon dioxide from the atmosphere and effectively lock it away in their tissues.
  - **Moderation of extreme events:** Ecosystems and living organisms create buffers against natural hazards such as floods, storms, and landslides.
  - **Waste-water treatment:** Micro-organisms in soil and in wetlands decompose human and animal waste, as well as many pollutants.
  - **Erosion prevention and maintenance of soil fertility:** Soil erosion is a key factor in the process of land degradation and desertification.
  - **Pollination:** Some 87 out of the 115 leading global food crops depend upon animal pollination including important cash crops such as cocoa and coffee.
  - **Biological control:** Ecosystems are important for regulating pests and vector borne diseases.

- **Habitat or Supporting Services** underpin almost all other services. Ecosystems provide living spacesfor plants or animals; they also maintain a diversity of different breeds of plants and animals.
  - **Habitats for species:** Habitats provide everything that an individual plant or animal needs to survive. Migratory species need habitats along their migrating routes.
  - **Maintenance of genetic diversity:** Genetic diversity distinguishes different breeds or races, providing the basis for locally well-adapted cultivars and a gene pool for further developing commercial crops and livestock.

- **Cultural Services include the non-material benefits people obtain from contact with ecosystems. They´include aesthetic, spiritual and psychological benefits.**
  - **Recreation and mental and physical health:** The role of natural landscapes and urban green space for maintaining mental and physical health is increasingly being recognized.
  - **Tourism:** Nature tourism provides considerable economic benefits and is a vital source of income for many countries.
  - **Aesthetic appreciation and inspiration for culture, art and design:** Language, knowledge and appreciation of the natural environment have been intimately related throughout human history.
  - **Spiritual experience and sense of place:** Nature is a common element of all major religions; natural landscapes also form local identity and sense of belonging.

- Indicators are frequently used to measure ecosystem services, as many services are not directly measurable.
- Sediment loads in rivers, for example, can be used as indicators of erosion control. The number and types of fish species in an area can be used as an indicator of the health of fisheries (Karr 1981).
- Consulting experts and stakeholders can help determine which indicators are relevant, meaningful, understandable, and measurable.

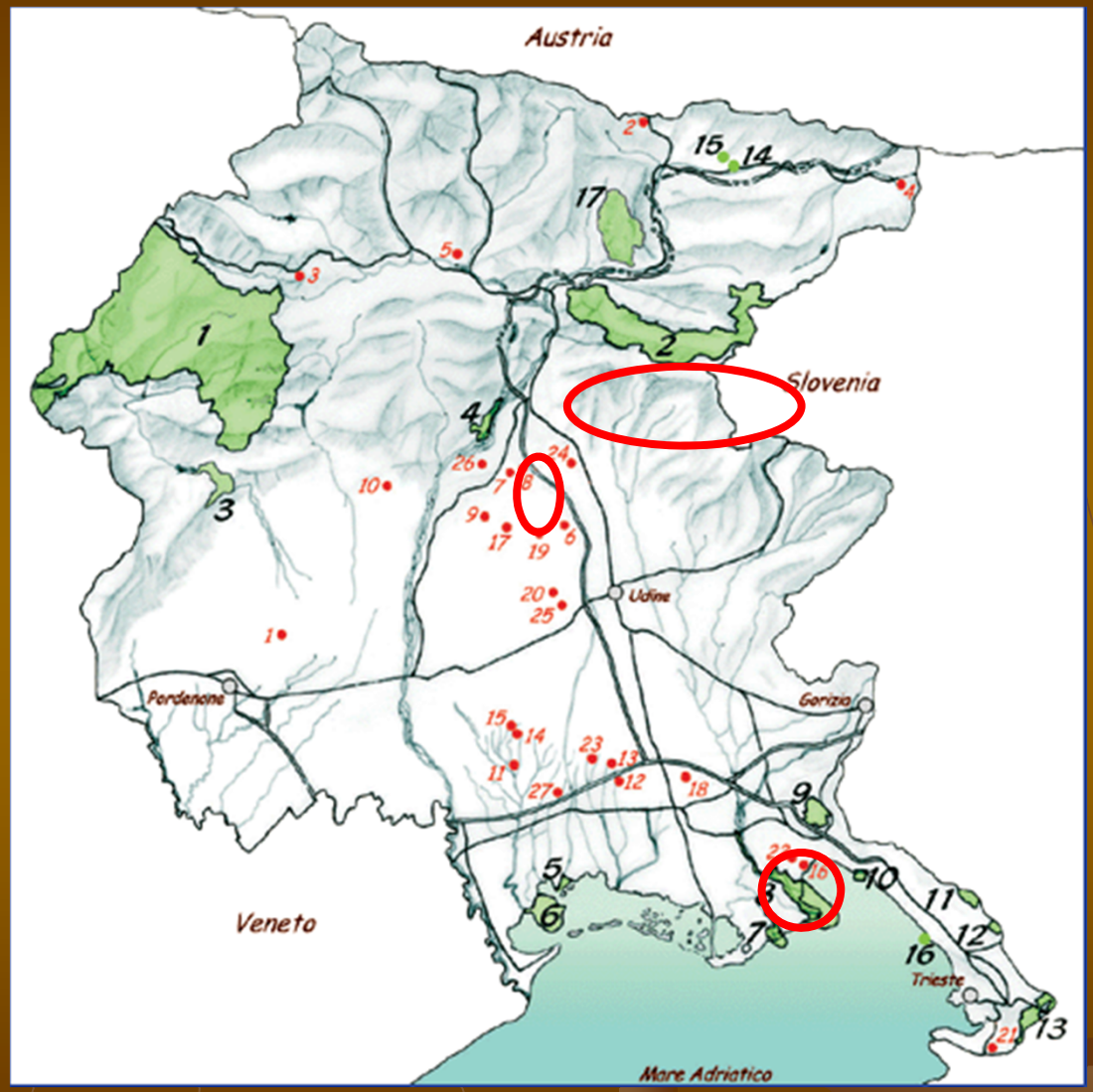
- **After the MA and the TEEB programms was created a lot of indicators set for many areas of the world…. not for Alps.**



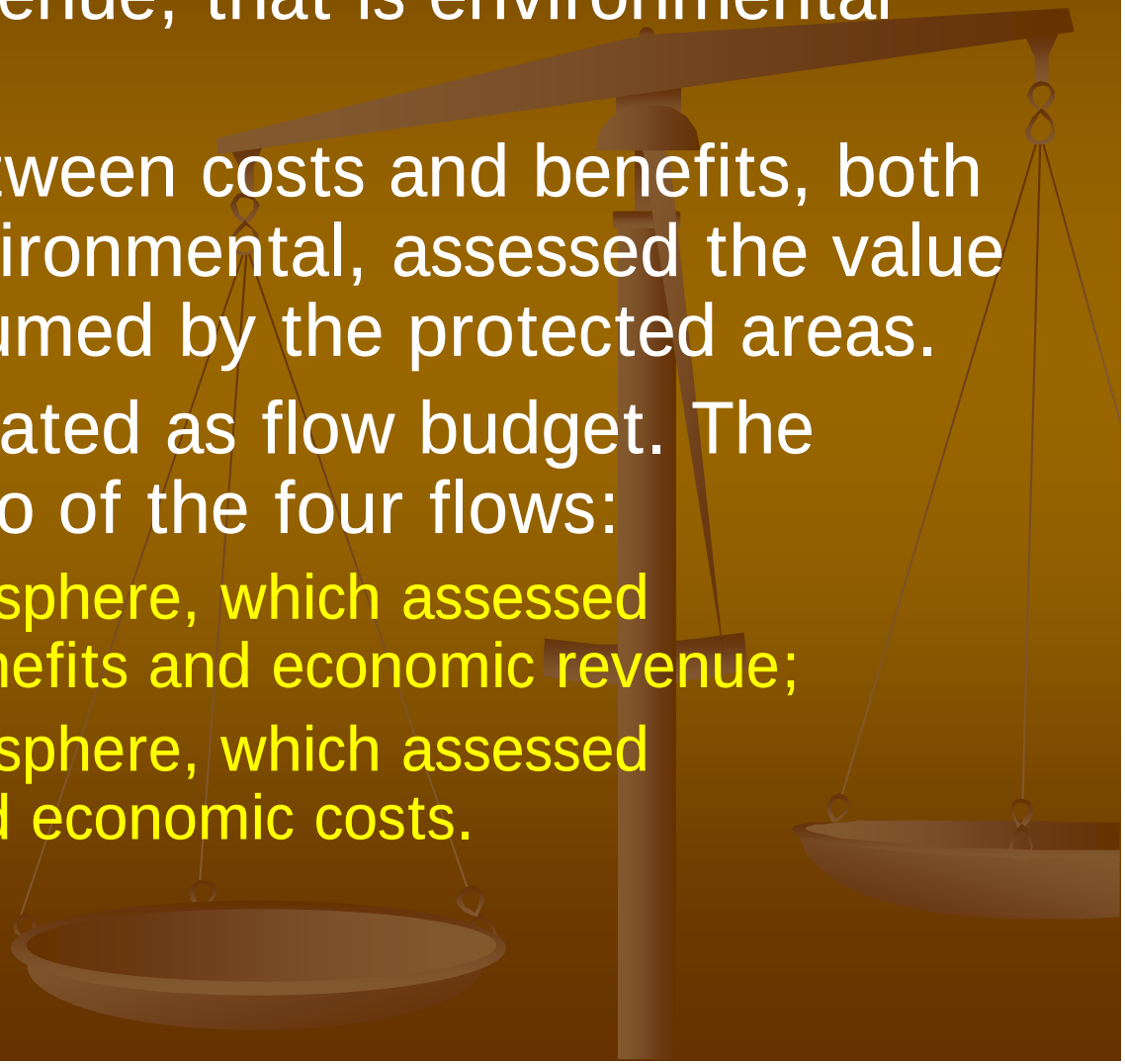
The SARA project

- **Environmental Accounting Model for the System of the Natural Protected Areas in Friuli Venezia Giulia**
- made by C.E.T.A. in the name and on the behalf of the Autonomous Region of Friuli Venezia Giulia in the framework of the S.A.R.A. (Regional Environmental Areas System, in Italian - Sistema Aree Regionali Ambientali) Project
- Since 2007 the C.E.T.A. and the Friuli Venezia Giulia Region have collaborated in order to establish an environmental accounting model for the Regional Environmental Areas System (in Italian: Sistema Aree Regionali Ambientali – S.A.R.A.).

- Pilot areas (red circled):
  - Prealpi Giulie Regional Natural Park,
  - Isonzo River Mouth Regional Natural Reserve
  - Cornino Lake Regional Natural Reserve



- The model aimed to integrate economic (cost and revenue) with environmental accounting, that reflect not only environmental cost but also environmental revenue, that is environmental benefit.
- The difference between costs and benefits, both economic and environmental, assessed the value produced or consumed by the protected areas.
- The model is indicated as flow budget. The study analyzed two of the four flows:
  - biosphere-technosphere, which assessed environmental benefits and economic revenue;
  - technosphere-biosphere, which assessed environmental and economic costs.



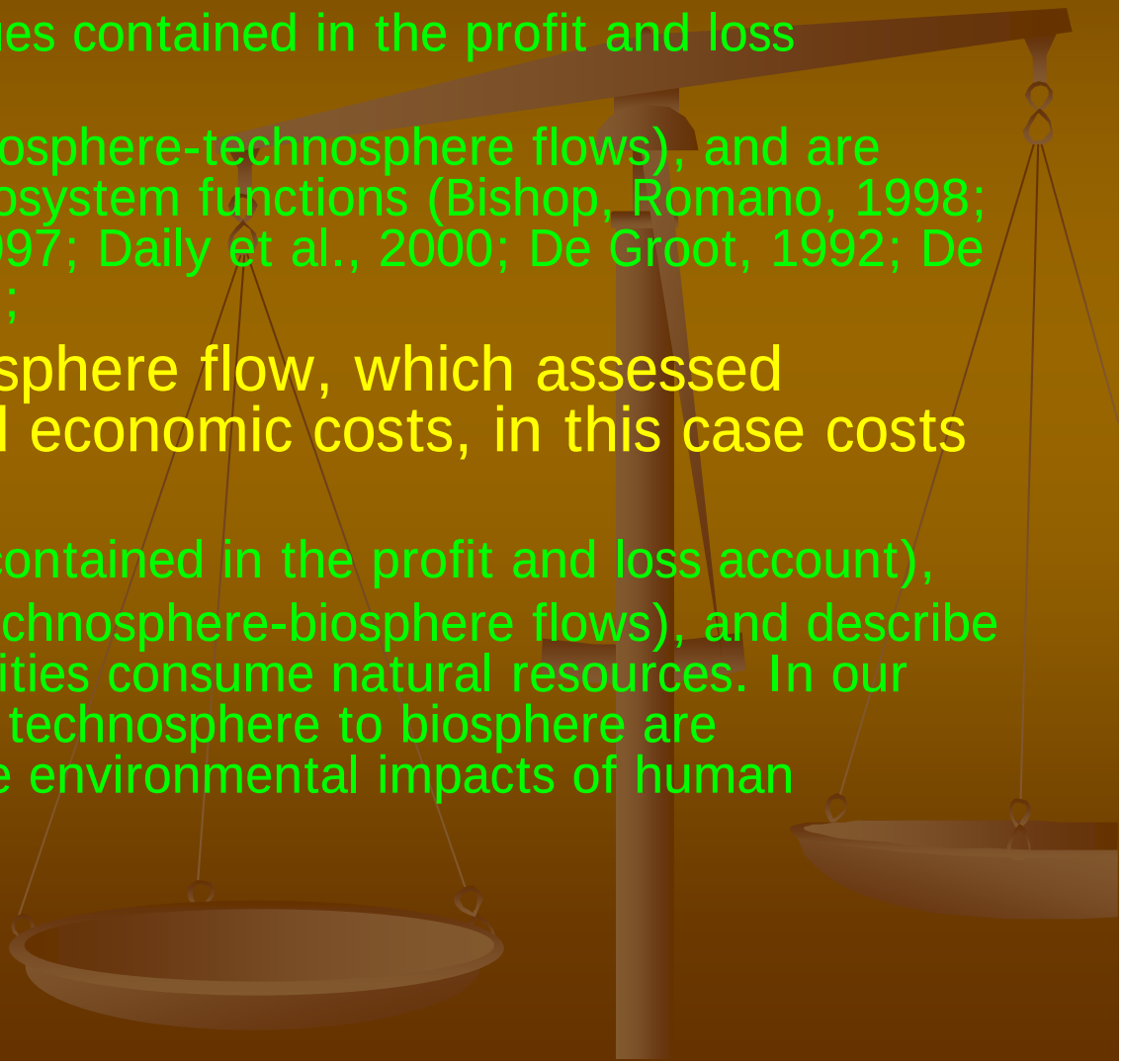
- Flows from biosphere to technosphere are the ecosystem functions. Economic valuation of the protected areas ecosystem functions assessed environmental benefits.
- The technosphere-biosphere template describes how humane activities consume natural resources and reports the monetary valuation. Human activities are divided in sectors labeled with the management scope of the protected areas (management, tourism, education, accounting, etc.).
- Valuing and reclassifying as described, we tried to assess the natural heritage produced or consumed by the protected areas.

- Method
- The model adapted the economic asset account. The environmental accounting structure for the protected areas includes a natural capital dimension (natural stock account) and a flow dimension (natural flow account) (Table 1).
  - Table 1. Environmental Accounting Model for Protected Areas

Natural stock account	Natural flow account	
Natural stock:	**Costs:**	**Benefits:**
Quantity	Monetary: reserve costs	Monetary: reserve revenues
Quality	Environmental: environmental costs	Environmental: environmental benefits

- Natural stock accounts should be set up based on a long time series. Data should refer to natural resources quality (species) and quantity (density). Physical data on stocks are usually compiled by biologists, who use different methods to estimate the size of these stocks (UN et al., 2003).
- Natural flow account assesses physical flows between the biosphere and technosphere and is indicated as “Natural resources asset account” (UN et al., 2003).

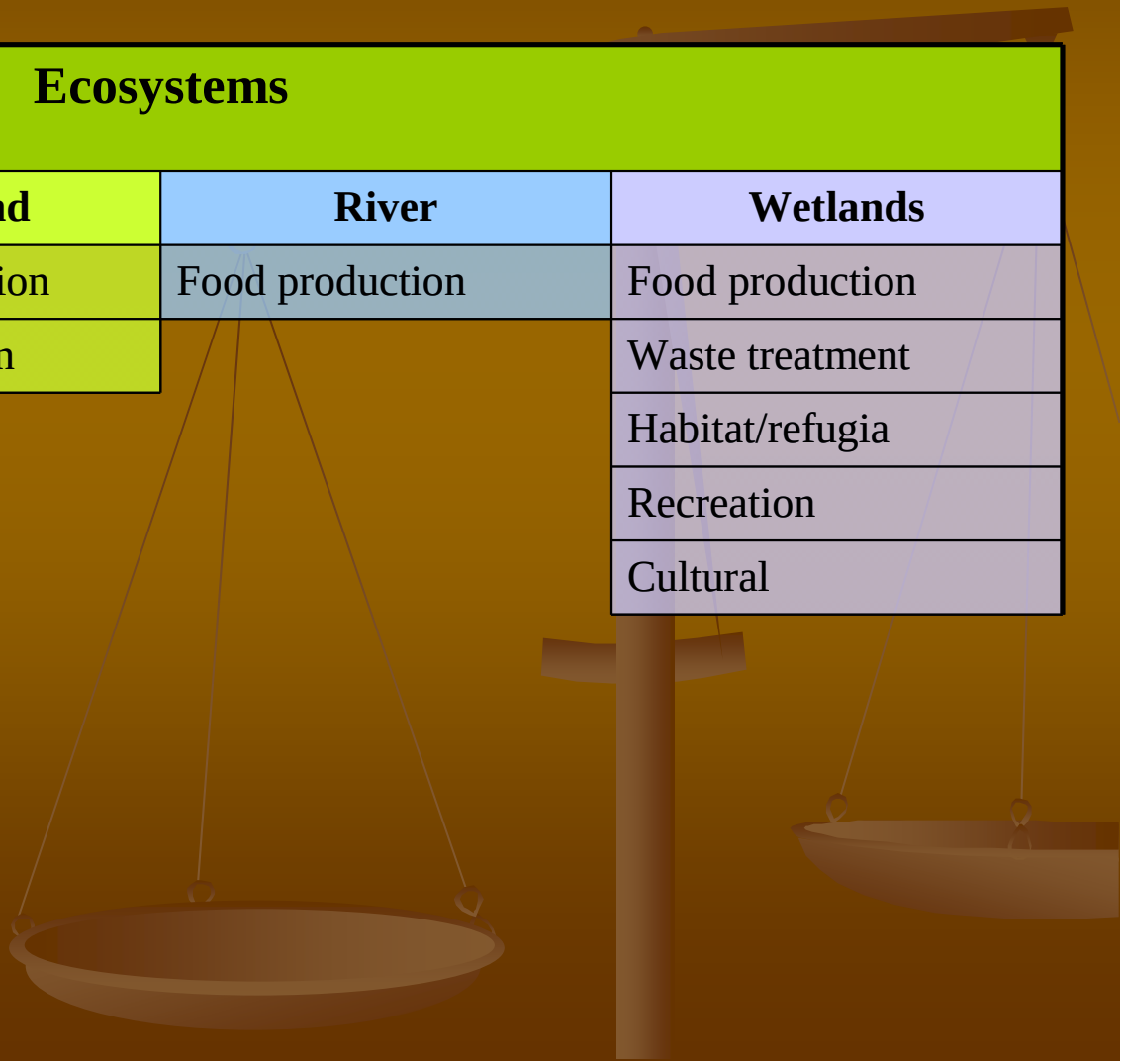
- The study analyzed:
  - biosphere-technosphere flow, which assessed environmental benefits and economic revenue, in this case benefits are:
    - monetary (revenues contained in the profit and loss account),
    - environmental (biosphere-technosphere flows), and are represented by ecosystem functions (Bishop, Romano, 1998; Costanza et al., 1997; Daily et al., 2000; De Groot, 1992; De Groot et al., 2002);
  - technosphere-biosphere flow, which assessed environmental and economic costs, in this case costs are:
    - monetary (costs contained in the profit and loss account),
    - environmental (technosphere-biosphere flows), and describe how humane activities consume natural resources. In our model, flows from technosphere to biosphere are represented by the environmental impacts of human activities.



- Results and analysis
  - Monetary costs and revenues had been reclassified according to the main management goals (conservation and valorization of natural resources; dissemination, environmental education, scientific research; promotion of sustainable development; management) departing from the income statement.
  - Environmental costs are related to management goals which benefit from materials and energy flows from the biosphere and cause impacts related to: anthropic presence, consumption of raw materials, motor and heating fuel, electricity, water and administration expenses. In order to transform impacts into environmental costs, the consumption items had been converted into equivalent tones of CO2, and considering a social cost of carbon (SCC) of 33,33 €/tC, the monetary value had been obtained.
  - Referring to environmental benefits, protected area's ecosystem was selected, and the following functions have been identified: climate regulation, soil formation, food production, biological control, raw materials, waste treatment, habitat/refugia, recreation, and cultural (Costanza et al., 1997) (Table 2).

Table 2. Ecosystem functions

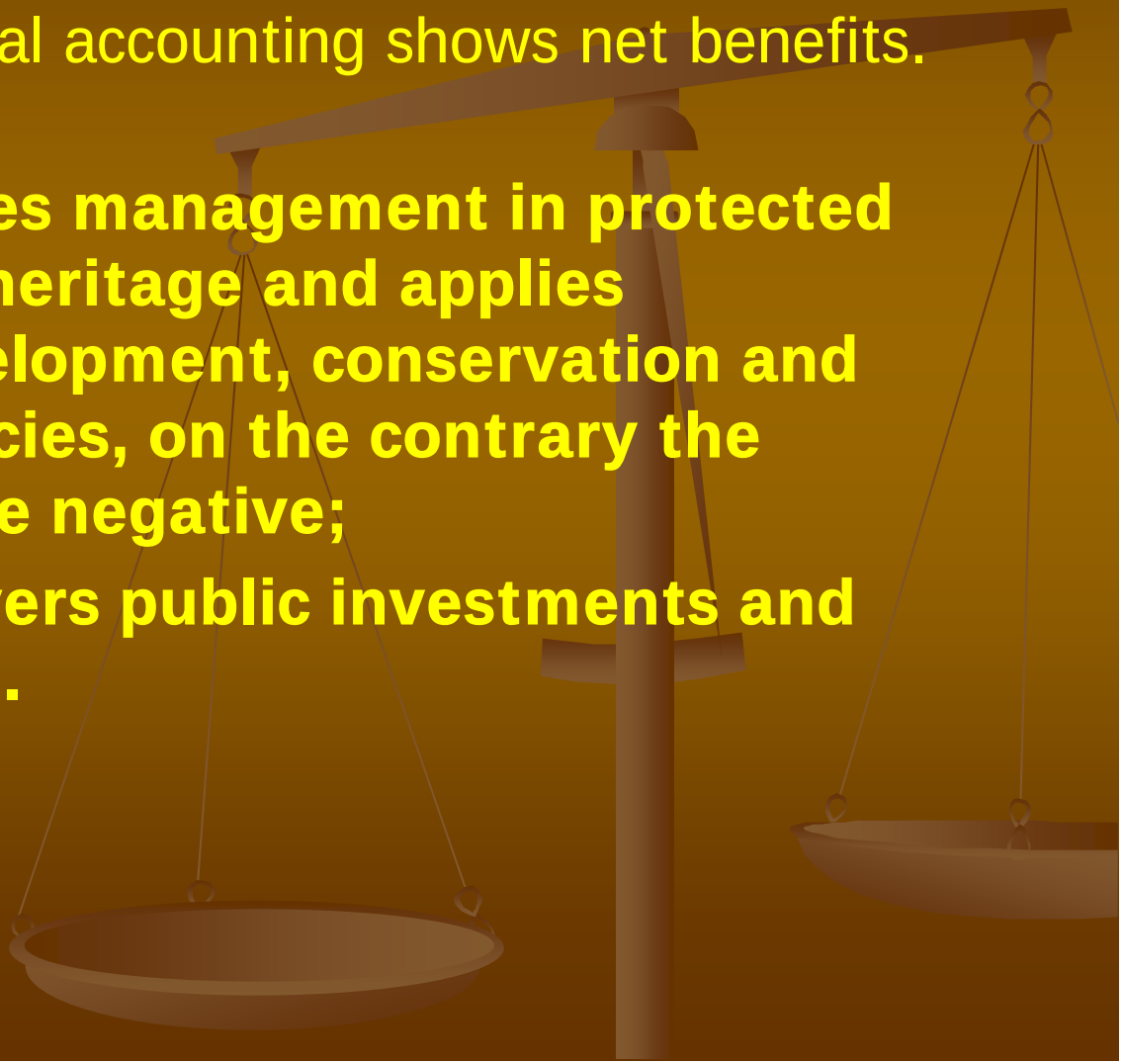
Ecosystems			
Forest	**Grassland**	**River**	**Wetlands**
Climate regulation	Climate regulation	Food production	Food production
Soil formation	Food production		Waste treatment
Food production			Habitat/refugia
Biological control			Recreation
Raw materials			Cultural
Recreation			
Cultural			



- The climate regulation function measures the carbon content stored by forest and grassland. We assessed the carbon stored/ha and considering protected area's surface and the SCC we assessed the avoided costs.
- The soil formation function considers the soil productivity. Considering the market value of the compost and by multiplying by the protected area's surface we estimated the annual value of its contribution to soil formation function.
- Food production takes into consideration underbrush fruits harvesting and fishing. It has been estimated harvesting and fish catching and by multiplying quantities by market value we obtained an estimate of the monetary value of the food production function.
- As far as the biological control function is concerned, control exerted by the high trophic levels is at least 30% of the food production value.
- Raw materials concerns only renewable biotic resources (in our case timber). It has been estimated timber harvesting and by multiplying the harvested quantities by market value we obtained an estimate of the monetary value of the raw material function.
- Natural systems are able to store and recycle certain amounts of organic and inorganic human waste. Referring to the literature (Costanza et al., 1997) we applied the suggested replacement cost and we assessed the monetary value of the waste treatment function.

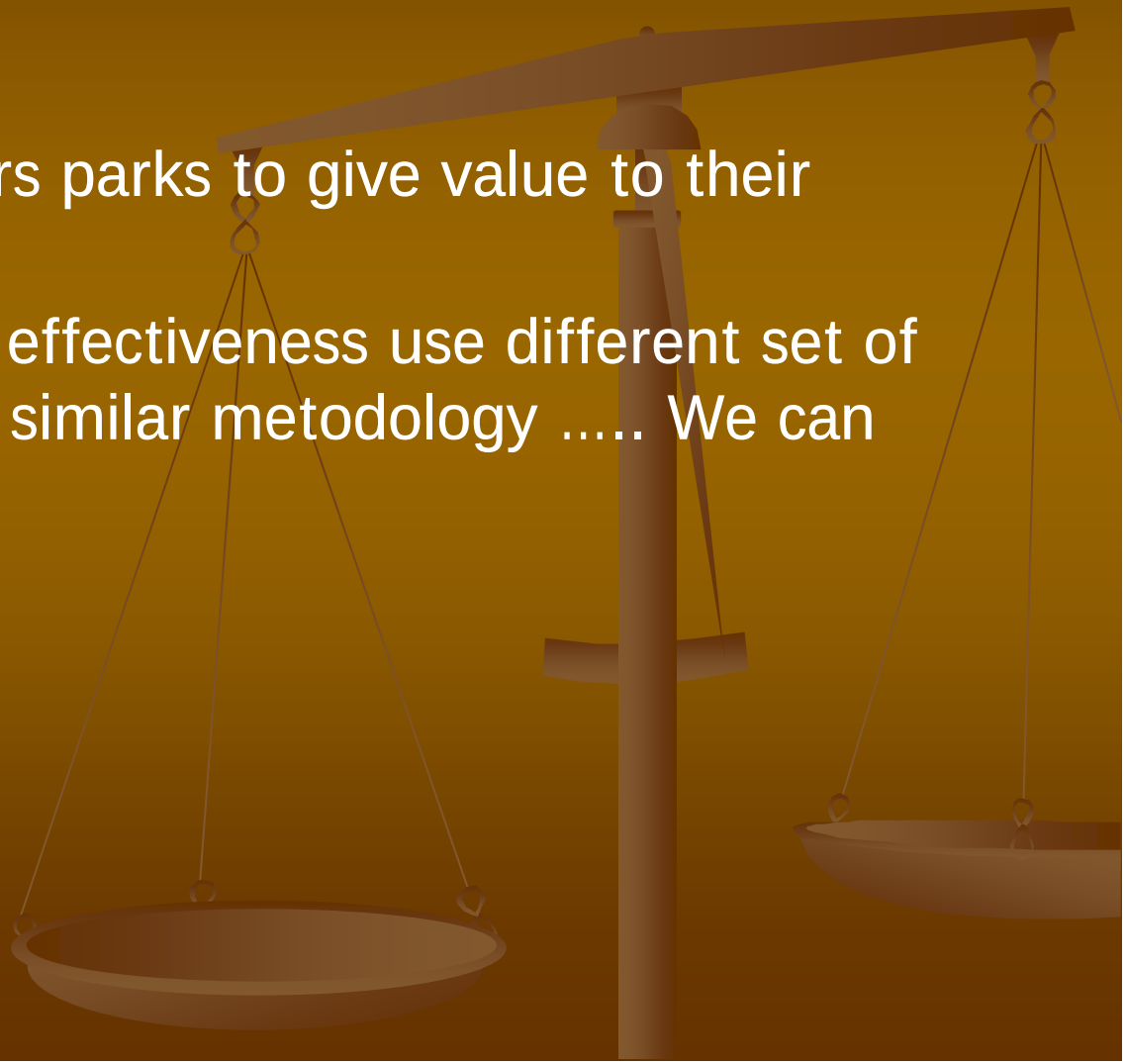
- Habitat/refugia function provides living space to wild plants and animals and breeding and nursery areas to species. We applied the value suggested by the literature (Costanza et al., 1997) and we assessed the monetary value of the habitat/refugia function.
- Focusing on tourism, the function has been divided into two categories: recreation and culture. Contingent valuation methods have been used to assign a monetary value to the benefits which derive from recreational activities. Moreover, tourism produce direct, indirect and induced economic effects estimated departing from the added value of daily tourist spending (accommodation, catering and publications).
- The cultural function has been divided into scientific and educational. The former regards research activity with an average value/hectare/year, which multiplied by the protected area's surface gave the assessed monetary value of the scientific function. The second regards educational activity producing revenues according to entrance fees.
- In order to conclude the cost analysis, the income statement costs have to be added to the environmental costs.
- By subtracting costs from benefits, both monetary and environmental, we obtained the three protected area's annual net benefit.
- **And finally, we implemented a user friendly software that helps parks manager in the previous explained assessment procedure.**

- **Discussion**
  - From an analytical point of view, in general protected areas environmental accounting shows net benefits. This means that:
  - **natural resources management in protected areas produces heritage and applies sustainable development, conservation and valorization policies, on the contrary the balance would be negative;**
  - **net benefits covers public investments and produces wealth.**



Ended the SARA project presentation I have Some questions for You

- Is important for others parks to give value to their ecosystem services?
- ES and management effectiveness use different set of indicators, but needs similar metodology ..... We can work together?



Vision: Making Nature Economically Visible

- Biodiversity in all its dimensions – the quality, quantity and diversity of ecosystems, species and genes – needs to be preserved not only for societal, ethical or religious reasons but also for the economic benefits it provides to present and future generations.
- We should aim to become a society that recognizes, measures, manages and economically rewards responsible stewardship of its natural capital.

- TANKS FOR YOUR ATTENTION!