ECOSYSTEM HEALTH ASSESSMENT


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The “Ecosystem Health” paradigm has been forged since late 80’s. Most recently, substantial advances in environmental toxicology have provided an invaluable contribution to decipher this paradigm and priorities in this research field were stated by the Ecosystem Health Network (Germany-Canada) in 2005, say: (a) development, validation and application of bioanalytical tools (biomarkers, bioassays, biosensors); (b) risk assessment of emerging chemical pollutants; (c) validation of innovative analytical tools (genomics, proteomics); (d) conceptual and methodological convergence between toxicology (human health) and ecotoxicology (ecosystem health); and (e) harmonization of scientifically based data with regulatory policies. The CBET group is an active partaker in this progression of the Ecosystem Health paradigm at the international level. Since the early 80’s, our group has been investigating the biological effects of contaminants in both terrestrial and aquatic ecosystems with a common conceptual and methodological approach (biomarkers + bioassays + bioanalytical chemistry) applied to target sentinel species that are representative of the corresponding ecosystem in terms of health.

Marine ecosystem health assessment. Pioneering monitoring programmes were started in the Abra estuary (1991-93) and in Urdaibai (1991-94). Since 1998, ecosystem health assessment (using mussels and fishes as sentinels) has been carried out in North Sea and Mediterranean Sea within the framework of international projects/contracts (XENO FISH, 1998-1999; BECPELAG, 2002; WCM, 2004; BEEP, 2001-04). Since 2000, the biological impact of the refinery sewage discharges outside the Abra estuary is being annually assessed (Petronor contract). After the Prestige oil spill, its biological impact was assessed in 22 localities from Portugal to the Basque Country (2003-2006) and in laboratory experiments using mussels and fishes (anchovy, hake and grey mullet) as sentinels/experimental models (IMRES; PRESTEPSE). This investigation is being completed with lab experiments (PRAGMA; 2006-07) and a running field research (PRESTIMES; 2008). Further on, monitoring campaings have been continued (IMRES II; 2006-08) in the Basque coast in order to obtain baseline values suitable as reference values for future accidental spills; to evaluate the effects of chronic pollution; and to implement new monitoring technologies useful for environmental decision makers (Water Framework Directive, European Marine Strategy).

Soil ecosystem health assessment. Laboratory studies on the pollution effects in soil organisms (slugs) were the starting point of our research activities in early 80’s. Later, most relevant field studies, using mining areas in Wales and volcanic areas in Açores as experimental fields, started in 1994 (PRAXIS XXI, 1996-99) and gave rise to more active field research within the framework of the BERRILUR strategic project (2003-ongoing) and PACARI (2006-09), which included slugs and earthworms as sentinels/experimental models. Most efforts are being addressed to harmonize scientifically based data with regulatory policies (Law for Soil protection) and to understand the consequences of chronic pollution for soil ecosystem health and its assessment.

Ecosystem health and climate crisis. Due to the increasing concern on the risks posed by climate crisis, we are currently involved in the investigation of the interactions between ecosystem health, chemical pollution and (global and local) threats resulting from anthropic changes in climatic conditions (K-EGOKITZEN, 2007-09).
List of 6 most relevant publications on ecosystem health assessment:


ZORITA, I; APRAIZ, I; ORTIZ-ZARRAGOITIA, M; ORBEA, A; CANCIO, I; SOTO, M; MARIGOMEZ, I; CAJARAVILLE, MP. Assessment of biological effects of environmental pollution along the NW Mediterranean Sea using mussels as sentinel organisms. *Environmental Pollution*, 148: 236-250 (2007).