Socioecológica y Biología de la Conservación

Francisco A. Squeo y Carlos Gaymer
Coordinadores

http://www.biouls.cl/docencia/dr-bea/
Contraseña: beabc

UNIDAD III: Gestión de la Biodiversidad

Clase 6

Conservación: Enfoques en Especies, Paisajes y Ecosistemas

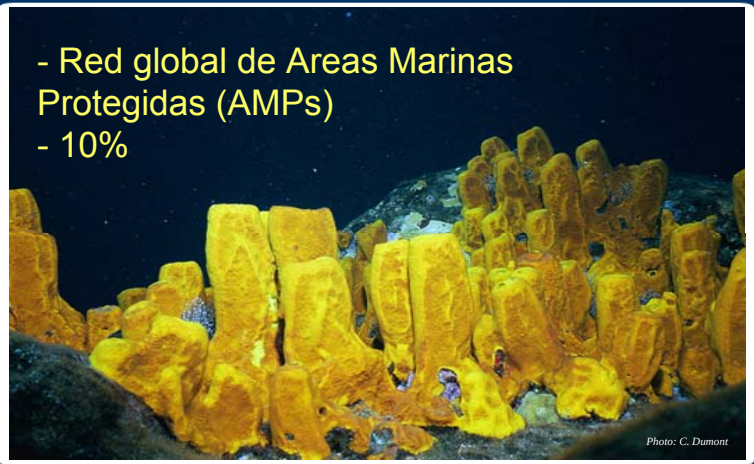
Tema 1: Enfoques en Especies y Paisajes

Tema 2: Enfoque en Ecosistemas

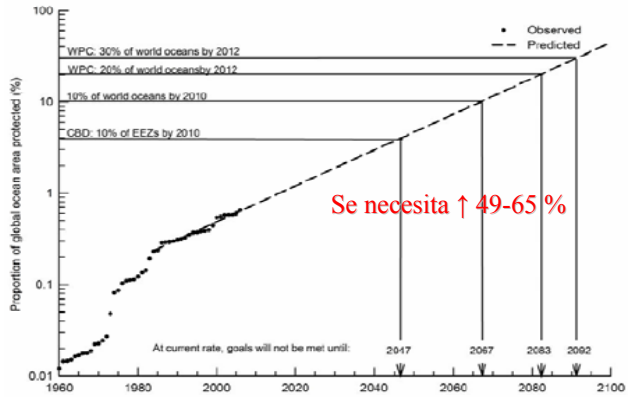
(22 de octubre 2008)

¡¡Objetivo 2012!! (WSSD, Johannesburgo 2002)

- Red global de Areas Marinas Protegidas (AMPs)
- 10%



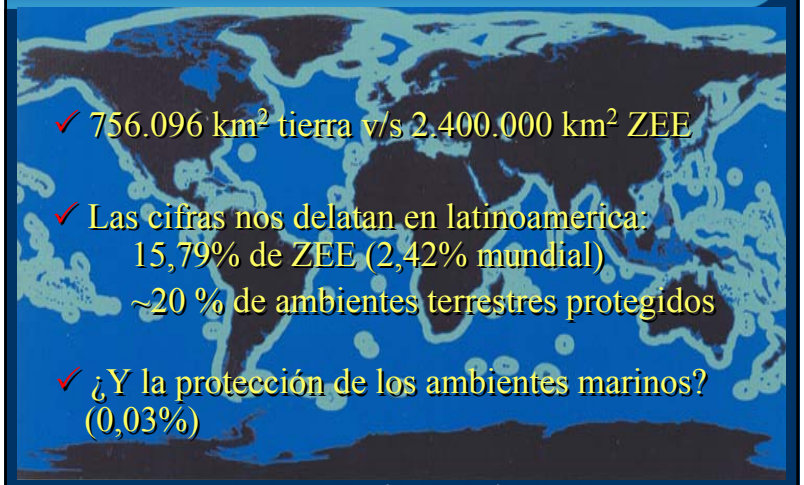
Promesas poco realistas



WPC= World Parks Congress (2003)
CBD= Convention on Biological Diversity (2006)

Oryx 42: 340-351

La paradoja chilena



- ✓ 756.096 km^2 tierra v/s 2.400.000 km^2 ZEE
- ✓ Las cifras nos delatan en latinoamerica:
  15,79% de ZEE (2,42% mundial)
  ~20 % de ambientes terrestres protegidos
- ✓ ¿Y la protección de los ambientes marinos? (0,03%)

¿Qué conservamos?

- ✓ Especies?
- ✓ Recursos?
- ✓ Comunidades?
- ✓ Habitats?
- ✓ Ecosistemas?

Enfoque de AMPs chilenas

- ✓ Ley de Pesca y Acuicultura
  → AMERB, parques (1), reservas (5)
- ✓ CPPS, 3 AMCP-mu (+ Las Cruces)

Programa ecoregional

1.- Identificar metas de conservación (*e.g.,* hábitats, especies).

2.- Recolección de datos de ecología y distribución de las especies.

3.- Determinar objetivos de conservación, para las metas anteriormente propuestas (*e.g.* 10%).

4.- Identificación de un set de sitios que permitan cumplir las metas y objetivos de conservación.

Site conservation planning

1	What are the conservation targets and long-term goals for those targets?	*TARGETS & GOALS*
2	What ecological and biological attributes sustain the targets over the long-term?	*ECOLOGICAL INFORMATION*
3	What are the characteristics of the human communities at the site?	*HUMAN CONTEXT INFORMATION*
4	What current and potential activities interfere with the maintenance of ecological processes that sustain the targets?	*THREAT ASSESSMENT*
5	Who are the organized groups and influential individuals at the site, what are their interests, what impacts might we have on them, and how might they help or hinder us in achieving site goals?	*STAKEHOLDER ASSESSMENT*

Site conservation planning

6	What can we do to prevent or mitigate threatening activities, and how can we influence important stakeholders?	*CONSERVATION STRATEGIES*
7	What are the areas on the ground where we need to act?	*CONSERVATION ZONES*
8	What actions are necessary to accomplish our goals, who will do them, how long will they take, how much will they cost?	*IMPLEMENTATION*
9	Can we succeed in our goals, based on assessment of both ecological possibilities and programmatic strengths?	*FEASIBILITY*
10	How will we determine whether we are making progress toward our goals?	*MEASURES OF PROGRESS*

Las poblaciones y como ellas cambian

El ciervo del cabo Florida posee 20 poblaciones; 75% en sólo dos islas.

Mortalidad: atropellos por vehículos (pero al elimina esta causa puede aumentar la probabilidad de transmisión de enfermedades)….
Medida: control de natalidad.

Mecanismos de regulación poblacional

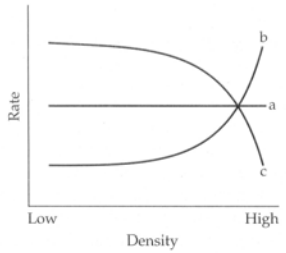


Figure 12.2 This figure demonstrates density-independent (a) and density-dependent (b and c) population responses. In the case of a density-independent response (a), density has no influence on a given parameter, such as mortality or birth rate. In the case of density-dependence, a parameter such as mortality may increase at higher densities (b), while other parameters, such as clutch size or individual growth rate, may decrease at higher densities (c). The particular shapes of the response curves, of course, would vary greatly among species and environments.

Factores denso-dependientes pueden afectar las tasas de mortalidad (+) o natalidad (-) debido a:

Reducción de los recursos

Aumento de la predación, parasitismo o enfermedades

Incremento de la intensidad de las interacciones sociales

Efecto Allee

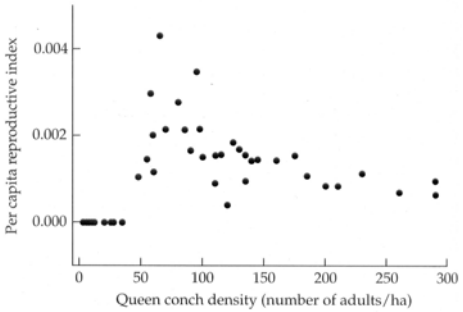


Figure 12.4 Queen conch (*Strombus gigas*) suffer from Allee effects in the Exuma Cays, Bahamas. Per capita reproductive activity is zero when adult queen conch density is below 50 individuals per hectare, but it increases once individuals congregate in greater numbers. (Modified from Stoner and Ray-Culp 2000.)

El efecto Allee ocurre cuando la densidad de una población es extremadamente baja y por razones puramente relacionadas con la biología de la especie no se permite que crezca la población, incluso disminuye y puede llegar a extinguirse.

Problemas de poblaciones pequeñas

Cuatro causas de extinción de poblaciones pequeñas

- Pérdida de variabilidad genética
- Variabilidad demográfica y declinación (incertidumbre demográfica)
- Variabilidad ambiental (incertidumbre ambiental)
- Catástrofes

Incertidumbre ambiental

Figure 12.5 The upper Rakaia River provides a typical example of a braided river in New Zealand. (Photograph © Bill Bachman/Photo Researchers, Inc.)

Cambios en los canales del río destruye los nidos del Black Stilt (*Himantopus novaezelandiae*).

Estrategia de los conservacionistas: recolecta de huevos y reemplazan por huevos de cerámica para que continúen incubando; se reponen los huevos verdaderos después de las lluvias.

Dinámica de Fuente - Sumidero

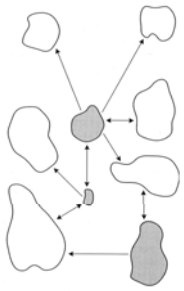


Figure 12.6 A schematic example of a metapopulation structure affected by source–sink dynamics. In this case, a few source habitats (shaded) provide excess individuals, which emigrate to and colonize sink habitats (open). Arrows indicate directions of movement of individuals. The sink habitats may be spatially larger than the sources, and may even have higher population densities and produce dispersing individuals, but their populations would go extinct were it not for the presence of the sources habitats.

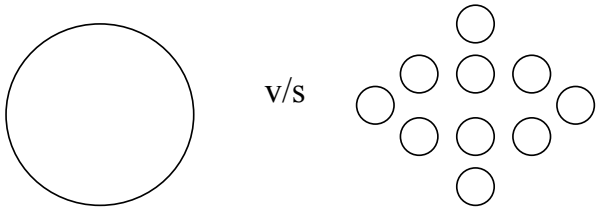
La dinámica de la población pueden depender de hábitat ricos y pobres.

Hábitat buenos (fuentes): éxito reproductivo es mayor que la mortalidad local, por lo que individuos pueden salir hacia otros ambientes.

Habitad pobres (sumideros): área que dependen de la inmigración para mantener sus poblaciones, si ellas se extinguen.

Metapoblación. Levins (1969) consideró originalmente muchas poblaciones en parches de hábitat con calidad similar.

SLOSS (single large or several small)



Ciervo del cabo Florida

Figure 12.1 Florida Key deer (*Odocoileus virginianus clavium*) now encounter habitats criss-crossed with roads, which has led to high mortality rates in some populations. (Courtesy of J. Gemme.)

Ocupación residencial resulto de la pérdida de hábitat y fragmentación en el Cabo Big Pine. La población quedo dividida en dos sectores: norte (mas productivo) y sur (menos productivo).

La tasa de crecimiento poblacional anual (λ, lambda) es 1,02 en el norte y 0,87 en el sur. La sub-población del sur se mantiene por inmigración (15% de la población norte se mueve al sur y sólo 5% de l sur al norte).

Ciervo del cabo Florida

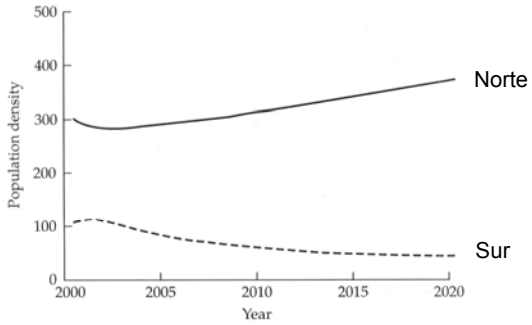


Figure 12.7 Population projection of the source population on Big Pine Key (NBPK, solid line) compared with the sink population (SBPK, dashed line). Without management to reduce mortality on SBPK, this population is at risk of extinction. (Modified from Harveson et al. 2004.)

Halcón Peregrino en California

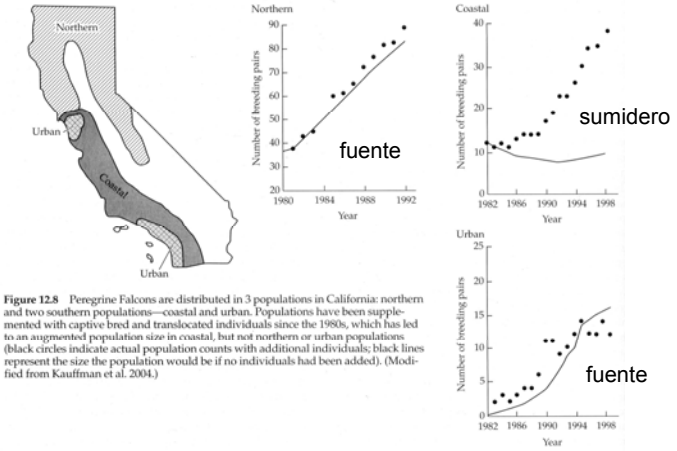


Figure 12.8 Peregrine Falcons are distributed in 3 populations in California: northern and two southern populations—coastal and urban. Populations have been supplemented with captive bred and translocated individuals since the 1980s, which has led to an augmented population size in coastal, but not northern or urban populations (black circles indicate actual population counts with additional individuals; black lines represent the size the population would be if no individuals had been added). (Modified from Kauffman et al. 2004.)

Espacio y Tiempo

Al categorizar los hábitat como fuente y sumidero hay que considerar cambios temporales y cambios denso-dependientes en la demografía de la población.

Natalidad y mortalidad pueden ser diferentes en el espacio (concepción clásica del concepto fuente-sumidero), pero también pueden cambiar en el tiempo. La calidad del hábitat pueden cambiar en el espacio y en el tiempo.

Sumidero versus seudo-sumideros. En este último caso la población no se extingue si se detiene la inmigración.

Metapoblación, umbrales de respuestas y conservación

Figure 12.9 Riparian habitats provide crucial corridor elements needed to maintain a viable population of cougars in southern California. (Photograph by R. and N. Bowers.)

Meta-población: conjunto de sub-poblaciones que ocupan parches de hábitat favorable en un paisaje de hábitats desfavorables.

Levins (1969) demostró que la fracción de hábitat favorables ocupados en un tiempo dado representa un balance entre la tasa de extinción y de colonización de parches.

Efecto rescate: la extinción local de una sub-población pequeña se puede prevenir por inmigración de parches vecinos.

Importancia de los corredores!!

Metapoblación, umbrales de extinción y conservación

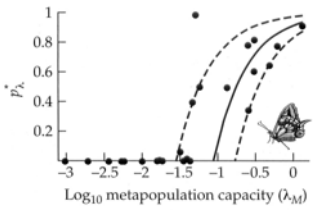


Figure A Extinction threshold in the Glanville fritillary butterfly. The *x*-axis gives the metapopulation capacity for each network; the *y*-axis shows the size of the respective metapopulation based on a survey of habitat patch occupancy in one year. (Modified from Hanski and Ovaskainen 2000.)

El cambio en la fracción de hábitat ocupados (p) en el tiempo (t) es descrita por el modelo de Levins (1969):

$$dp/dt = cp(1-p) - ep$$

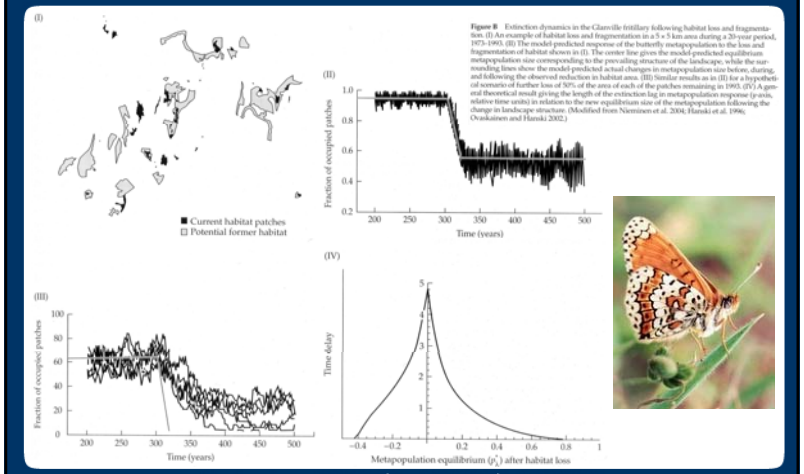
Donde *c* es la tasa de colonización y *e* es la de extinción.

El tamaño de una meta-población en equilibrio (p*) esta dada por:

$$p_\lambda^* = 1 - e / (c\,\lambda_M)$$

Para que persista una meta-población el umbral esta definido por $\lambda_M > e/c$.

Metapoblación, umbrales de extinción y conservación



Análisis de Viabilidad Poblacional

Se requieren datos sólidos de todos los factores que explican el número de individuos y un escenario futuro. Uso de modelos que examinan los efectos demográficos de distintas amenazas y manejos y la proyectan hacia el futuro.

Análisis de Viabilidad Poblacional

TABLE A *Potential Uses of PVA "Products"*

Category of use	Specific use	Sources for examples
Assessment of extinction risk	Assessing the extinction risk of a single population	Shaffer 1981, Shaffer and Samson 1985, Lande 1988
	Comparing relative risks of two or more populations	Forsman et al. 1996, Menges 1990, Allendorf et al. 1997
	Analyzing and synthesizing monitoring data	Menges and Gordon 1996, Gerber et al. 1999
Guiding management	Identifying key life stages or demographic processes as management targets	Crouse et al. 1987
	Determining how large a reserve needs to be to gain a desired level of protection from extinction	Shaffer 1981, Armbruster and Lande 1993
	Determining how many individuals to release to establish a new population	Bustamante 1996, Howells and Edwards-Jones 1997, Marshall and Edwards-Jones 1998, South et al. 2000
	Setting limits on the harvest or "take" from a population that are compatible with its continued existence	Nantel et al. 1996, Ratsirarson et al. 1996, Tufto et al. 1999, Caswell et al. 1998
	Deciding how many populations are needed to protect a species from regional or global extinction	Menges 1990, Lindenmayer and Possingham 1996

Poblaciones ecológicamente funcionales

Si se quiere mantener una rica red de interacciones comunitarias, se debe asegurar mas que la persistencia de especies bandera. Se debe conservar poblaciones lo suficientemente grandes para que cumplan sus roles ecológicos.

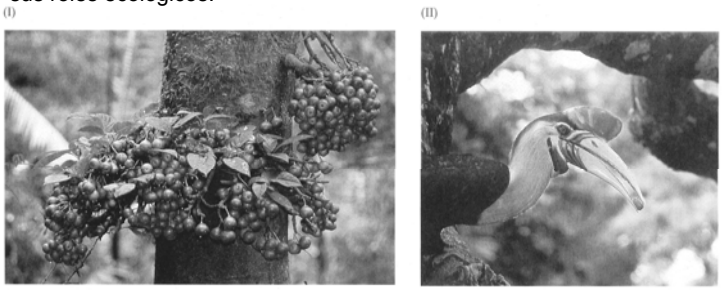


Figure A Large fig trees (I) serve as keystone resources for many species, including this Sulawesi Red-knobbed Hornbill (*Macaca nigra*) (II). (Photographs by M. Kinnaird.)

Poblaciones ecológicamente funcionales

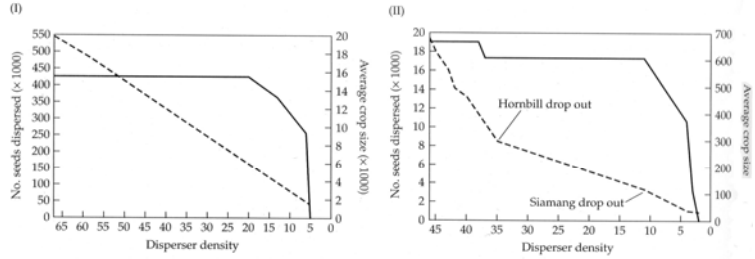


Figure B Effect of declines in disperser populations on number on seeds dispersed (dashed line) and average crop size of parent trees (solid line) for *Dracontomelon dao* (I) and *Polyalthia glauca* (II). *Dracontomelon* is dispersed by crested black macaques on Sulawesi and *Polyalthia* is dispersed by hornbills, siamang, and other primates on Sumatra. Differences in slopes reflect differences in dispersal service provided by each species or group of species.

El valor del análisis jerárquico para entender los cambios poblacionales

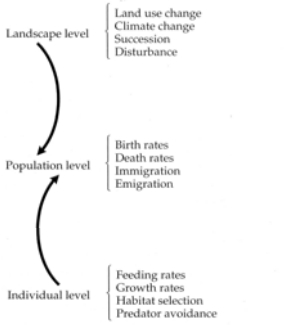


Figure 12.10 Population dynamics should be understood as resulting from a hierarchy of processes affecting populations at different levels. Landscape-level changes in the availability of habitat determine how much suitable habitat exists for a given species, and its configuration (and therefore its accessibility). The availability of suitable habitat and the behavior and physiology of individual organisms combine to influence the dynamics of populations.

El entendimiento de la dinámica de una población puede requerir el análisis a distintos niveles jerárquicos.

Bachman's Sparrow: cambio en la disponibilidad de hábitats apropiados

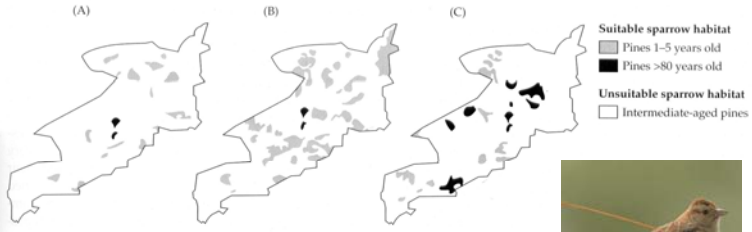
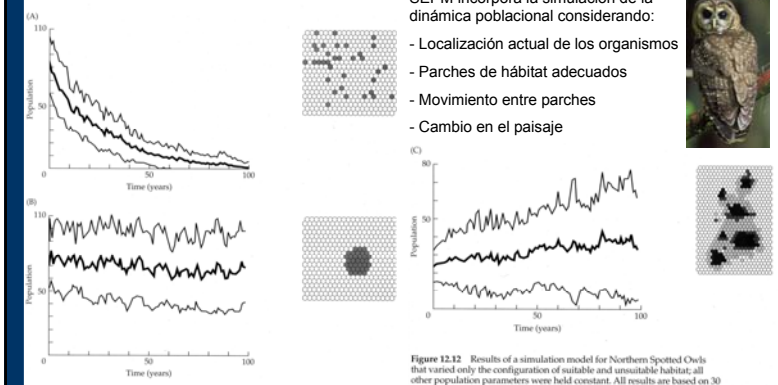


Figure 12.11 Distribution of suitable breeding habitat for Bachman's Sparrow in (A) 1970, (B) 1990, and (C) 2010 on a 5000-ha tract at the Savannah River Site, South Carolina. Bachman's Sparrow breeds both in older-growth pine forests and in young clear-cuts, but not in middle-aged pine stands. The distribution of habitats in 1970 is based on the land use history for the area; the distribution in 2010 is based on a proposed management plan. Notice the island-like nature of suitable habitat patches.

Modelos poblacionales espacialmente explícitos (SEPM)



SEPM incorpora la simulación de la dinámica poblacional considerando:

- Localización actual de los organismos
- Parches de hábitat adecuados
- Movimiento entre parches
- Cambio en el paisaje

Figure 12.12 Results of a simulation model for Northern Spotted Owls that varied only the configuration of suitable and unsuitable habitat; all other population parameters were held constant. All results are based on 30 simulations; the heavy line in each graph is the mean population response, and the thin lines are one standard deviation from the mean. (A) Suitable habitat is randomly scattered. (B) Suitable habitat is arrayed in one large block. (C) Clusters of suitable habitat are surrounded by marginal habitat (buffers). (From McKelvey et al. 1993.)

Mobile animal population (MAP) es un tipo de SEPM

Conservación del paisaje

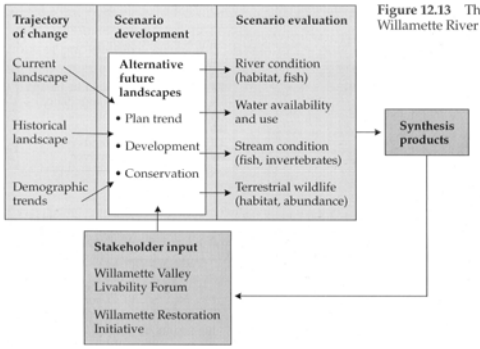


Figure 12.13 The alternative-futures analysis process for the Willamette River Basin. (Modified from Baker et al. 2004.)

El incremento de los hábitat alterados por el hombre requiere no sólo de evaluar la viabilidad de las especies a gran escala espacial, pero también proyectar las influencias ecológicas, sociales y económicas.

Efecto borde explica la mayoría de las extinciones en pequeñas reservas (i.e., aumento de la densidad de la población y cambio en el uso del suelo). Necesidad de considerar la matriz en los planes de conservación.

Considerando diferentes escenarios

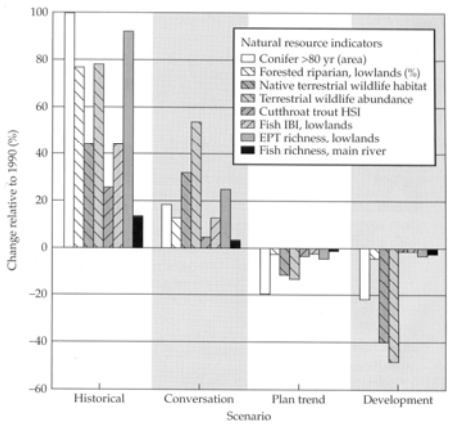


Figure 12.14 Percent change in several habitat, wildlife, and stream health indicators in the Willamette River Basin, in three alternative future scenarios, as explained in the text, relative to 1990 conditions. HSI, habitat suitability index; IBI, index of biotic integrity; EPT, Ephemoptera, Plecoptera, and Tricoptera richness in streams. (Historical conifer cover was 184% that of 1990 extent.) (Modified from Baker et al. 2004.)

Aproximación paisaje especie

Análisis de conservación y planeamiento a escala de paisaje se derivan de la aproximación paisaje especie. Esta se basa en:

- Selección de especies focales con amplia distribución (p.e. grandes carnívoros)
- Con hábitat esenciales que puedan ser definidos
- Con interacción con el hombre que puedan ser caracterizadas.

Se combinan distintas capas en SIG (p.e., actividades humanas, jurisdicciones políticas, además de las referidas a la especie focal).

Se identifican los elementos del paisaje que son esenciales y de alto valor para la conservación de la especie

Aproximación paisaje especie

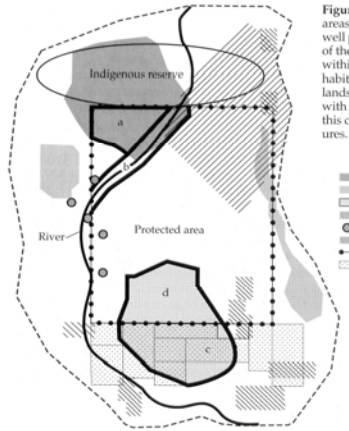


Figure 12.15 Combining a human and biological landscape reveals areas of threat to a landscape species, as well as areas that are already well protected. Areas labeled a and b represent regions where portions of the species' preferred resources and main water source (a river) lie within a protected area. Those labeled c and d are important breeding habitat, but only d is protected. To develop a full plan to conserve the landscape species, all essential elements need to be represented along with sufficient connectivity among these. Threats to the species within this critical landscape will need to be addressed through active measures. (Modified from Sanderson et al. 2002.)

Preferred food resource
Other food resource
Breeding habitat
Dry season refuges
Gold mining
Hunting
Protected area boundaries
Agricultural land

Combinación de paisajes humanos y naturales revela las áreas de amenaza

Aproximación paisaje especie

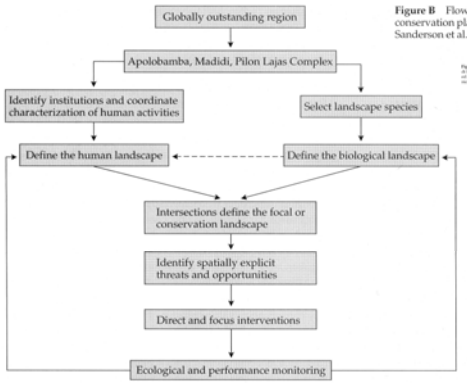
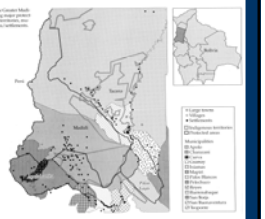


Figure 8 Flowchart of the landscape species approach to conservation planning, activities, and actions. (Modified from Sanderson et al. 2002.)



Pingüinos de Magallanes

Figure A Magellanic Penguins at their breeding colony at Punto Tombo, Argentina. (Photograph by P. D. Boersma.)

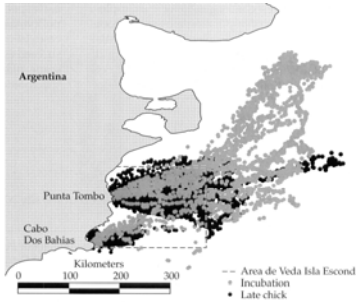


Figure B Satellite tracks of Magellanic Penguins from two breeding colonies in Argentina (Punta Tombo and Cabo Dos Bahías) during incubation (gray dots) and when they have large chicks (black dots). The Area de Veda Isla Escondida is where large fishing boats are excluded to protect the hake spawning grounds. Note that when the penguins have large chicks they forage primarily within this management area.

Reserva no es suficiente para cubrir el ámbito de hogar de los pingüinos. Cambio entre época de incubación y alimentación de polluelos

Modelos demográficos basados en el paisaje

Cantidad de hábitat remanente y grado de fragmentación

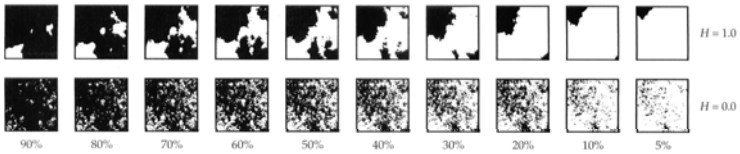
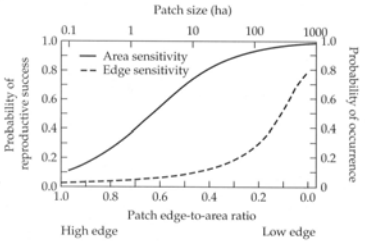


Figure A Different scenarios of landscape change created by a neutral landscape model in which both the amount (%) and degree of habitat fragmentation (H) were varied. H represents the degree of clumping in the landscape, and ranges from 0 to 1. When $H = 1$, the fragments are most closely associated spatially and form large blocks of habitat, whereas when $H = 0$, fragments are least associated, and spread widely throughout the landscape. (Modified from With 1997.)

Uso de SEPM (modelos poblacionales espacialmente explícitos) necesarios para evaluar riesgo de extinción por fragmentación de hábitat.

Modelos demográficos basados en el paisaje



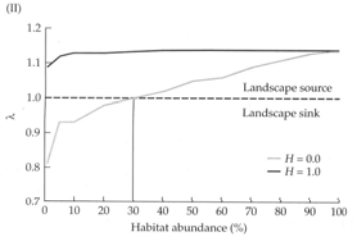


Figure B (I) Songbirds were characterized by two functions related to their area-sensitivity (probability of patch occupancy as a function of patch size) and edge-sensitivity (probability of reproductive success as a function of patch geometry). Shown here is a species with low area-sensitivity and intermediate edge-sensitivity. (II) Extinction risk for songbird populations in the two different landscape scenarios shown in (I). Landscapes function as potential population sources where population growth rates, λ, are greater than 1.0, and are at low risk of extinction. Landscapes function as population sinks where λ is less than 1.0, and are at high risk of extinction in the absence of immigration. A viability threshold thus occurs at $\lambda = 1.0$. (Modified from With and King 2001.)

Estableciendo el riesgo de extinción en la dinámica del paisaje

¿Cómo establecer el cambio del riesgo de extinción frente a una pérdida crónica de hábitat y fragmentación?

Uso de modelos demográficos con paisaje dinámico (p.e., SSAD, spatially structured avian demographic).

Umbral de vulnerabilidad

$\Delta\lambda / \Delta h < -0{,}01$

Donde $\Delta\lambda$ = cambio en la tasa de declinación y Δh = pérdida de hábitat. Equivalente a una reducción ≥1% de declinación anual de una población.

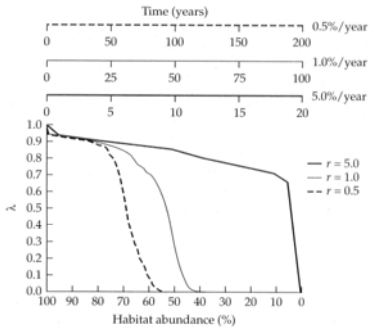


Figure C Extinction risk for migratory songbirds in dynamic landscapes undergoing chronic habitat destruction at different rates (r) and at an intermediate degree of fragmentation ($H = 0.5$). Because habitat destruction is occurring at different rates, the interpretation of the rate of population decline (λ) is time-dependent. Thus, the time scale above the graph depicts the period (number of years) over which the decline in populations occurs with respect to the rate of habitat loss (r).

Restauración de hábitat

Limitaciones demográficas para la recuperación de una población después de una restauración de hábitat. Es posible identificar escenarios donde la restauración de hábitat podría no ser suficiente para la recuperación de la población.

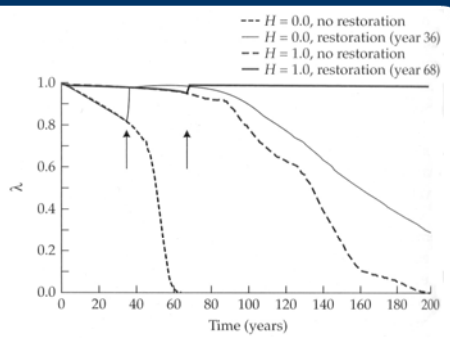


Figure D Effect of habitat restoration on the ability to recover migratory songbird populations. Habitat was initially destroyed at a rate of 1%/year, at a high ($H = 0.0$) and a low ($H = 1.0$) degree of fragmentation, until the population reached its vulnerability threshold ($\Delta\lambda_r/\Delta t < -0.01$). At this point (depicted by the arrows), the landscape was completely restored to its predisturbed state (100% habitat) where it remained throughout the duration of the simulation.

Leer

Groom MJ, GK Meffe y CR Carroll. 2006. Principles of Conservation Biology. Third Edition. Sinauer Associates, Inc., Sunderland, Massachusetts. Capítulo 12: Species- and Landscape-Level Approaches to Conservation

Ver también: www.sinauer.com/groom

Socioecológica y Biología de la Conservación

Francisco A. Squeo y Carlos Gaymer
Coordinadores

http://www.biouls.cl/docencia/dr-bea/
Contraseña: beabc

UNIDAD III: Gestión de la Biodiversidad

Clase 6

Conservación: Enfoques en Especies, Paisajes y Ecosistemas

Tema 1: Enfoques en Especies y Paisajes

Tema 2: Enfoque en Ecosistemas

(22 de octubre 2008)

Large Marine Ecosystems

LMEs de alta prioridad

Desafíos regionales

Red de AMPs

Corredores biológicos

Hacia el manejo costero integrado

Table 1
Transition from sector-specific to integrated coastal management (ICM)

From	To
Individual species	Ecosystems
Small spatial scale	Multiple scales
Short-term perspective	Long-term perspective
Humans independent of ecosystems	Humans as integral parts of ecosystems
Management divorced from research	Adaptive management

Source: Lubchenco 1994.

Ecosistema Manejado

La mejor solución para incluye cuando:

a) La decisión tiene sentido ecológico

b) Satisface las demandas socio-económicas

c) Existen las instituciones capaces de llevarlo a cabo.

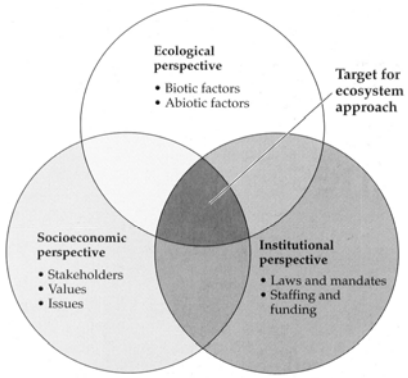


Figure 13.1 A conceptual basis for ecosystem management. Good ecosystem management lies at the intersection of ecological, socioeconomic, and institutional perspectives. (Courtesy of Dennis A. Schenborn.)

Acercamiento ecosistémico a la conservación

Un acercamiento para mantener o restaurar la composición, estructura y funciones de ecosistemas naturales y modificados con el objetivo de lograr una sustantabilidad ecológica y humana en el largo plazo.

Está basada en el desarrollo colaborativo de una visión de las futuras condiciones deseadas que integran las perspectivas ecológicas, socio-económicas e institucionales, aplicadas dentro de un contexto geográfico definido primariamente por los límites ecológicos naturales.

Elementos clave en un acercamiento ecosistémico

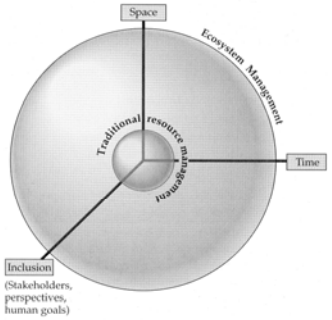


Figure 13.2 Ecosystem management as an expansion of traditional natural resource management in three dimensions. Temporal and spatial scales of concern, as well as degree of inclusion in those making decisions, are all expanded by ecosystem management.

Dimensión temporal: salud y vitalidad de los ecosistemas en un futuro indefinido (más que simplemente que ellos pueden hacer por nosotros ahora). El reto es unir las acciones de corto plazo con las perspectivas de largo plazo.

Dimensión espacial: expandir la mirada local para incluir grandes paisajes (terrestres y marinos) y sus conexiones. Considera heterogeneidad, conectividad, interacciones clave (polinización, dispersión).

Dimensión humana: inclusión de una gran diversidad de intereses, talentos y perspectivas en la toma de decisión sobre los recursos naturales y conservación. Requiere de participación y fiscalización ciudadana.

Participación y fiscalización ciudadana

TABLE 13.1 *What Is a Stakeholder?*

Stakeholders are people who want to or should be involved in a decision or action because they have some interest or stake in it. Their level of interest can vary from mild to intense. People can be stakeholders for a variety of reasons; they:

1. have a real or perceived interest in the resource, its use, its protection, or its users;
2. are dependent on a resource (e.g., subsistence users, sole means of livelihood);
3. have a belief that management decisions will directly or indirectly affect them;
4. are located in or near areas about which decisions are being made;
5. pay for the decision;
6. are in a position of authority to review the decisions.

Inclusion of stakeholders in decision-making helps to ensure that their concerns are met early on and that they "buy into" the decision through partial ownership, thus being more likely to support it later.

Source: Modifed from materials provided by Dennis A. Schenborn.

Convención para la conservación de los recursos marinos vivos de la Antártica

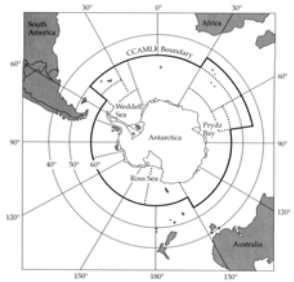


Figure 13.3 The CCAMLR manages a multi-national management area across a wide expanse surrounding Antarctica. (Modified from http://www.ccamlr.org/pu/e/conv/map2.htm.)

El objetivo de la Convención (CCRVMA) es la conservación de la vida marina del Océano Austral. Esto no excluye su explotación, siempre que ésta se realice de manera racional.

a) Se ha establecido un criterio 'precautorio' para minimizar el riesgo asociado a las prácticas insostenibles en condiciones de incertidumbre.
b) Este enfoque se complementa con el 'enfoque ecosistémico' que toma en cuenta las interacciones ecológicas entre las especies y la variabilidad 'natural', a diferencia de la variabilidad 'inducida por el hombre'.
c) Por último, las medidas de conservación adoptadas por la CCRVMA se basan en el asesoramiento científico disponible y su cumplimiento determina el grado de su eficacia.

http://www.ccamlr.org

Convención de la Conservación Biológica

TABLE 13.2 *Twelve Principles of the Ecosystem Approach and Five Points of Operational Guidance Adopted by the Convention on Biological Diversity*

Overarching principles

1. The objectives of management of land, water, and living resources are a matter of societal choice.
2. Management should be decentralized to the lowest appropriate level.
3. Ecosystem managers should consider the effects of their activities on adjacent and other ecosystems.
4. There is usually a need to understand and manage the ecosystem in an economic context and to:
   a. reduce market distortions that adversely affect biological diversity.
   b. align incentives to promote biodiversity conservation and sustainable use.
   c. internalize costs and benefits in the given ecosystem.
5. Conservation of ecosystem structure and function, to maintain ecosystem services, should be a priority target.
6. Ecosystems must be managed within the limits of their functioning.
7. The ecosystem approach should be undertaken at the appropriate spatial and temporal scales.
8. Recognizing the varying temporal scales and lag-effects that characterize ecosystem processes, objectives for ecosystem management should be set for the long term.
9. Management must recognize change is inevitable.
10. The ecosystem approach should seek the appropriate balance between, and integration of, conservation and use of biological diversity.
11. The ecosystem approach should consider all forms of relevant information.
12. The ecosystem approach should involve all relevant sectors of society and scientific disciplines.

Points of operational guidance

1. Focus on the functional relationships and processes within ecosystems.
2. Enhance benefit-sharing.
3. Use adaptive management practices.
4. Carry out management actions at the scale appropriate for the issue being addressed, with decentralization to lowest level, as appropriate.
5. Ensure intersectoral cooperation.

Source: Modified from IUCN 2000.

Ecosistema Manejado

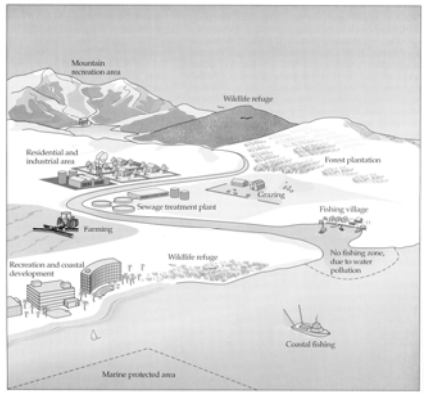


Figure 13.4 Ecosystem management attempts to involve all stakeholders that affect a large ecosystem and whom are affected by management practices within that system. In this case, a watershed is managed for many purposes, and thus a large network of stakeholders are involved in its management. Even the management of any component may be affected by the actions of other other users of the system. (Modified from Miller 1996.)

El Ecosistema Gran Yellowstone

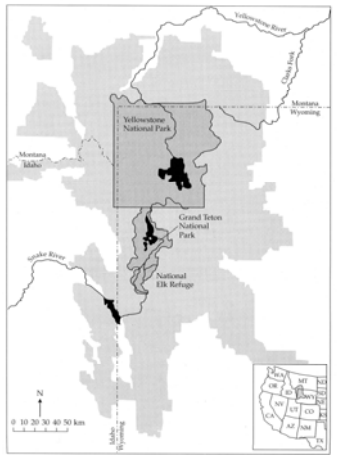


Figure 13.5 The Greater Yellowstone ecosystem. Note the relationship of Yellowstone and Grand Teton National Parks (dark shading) to the various surrounding national forests, wildlife refuges, and other wild lands (light shading). Black denotes major lakes.

Varios ecosistemas biofísicos deben ser considerados en un acercamiento ecosistémico.

Migraciones de los bisontes, alces y otros vertebrados salen de los límites del parque

Efectos ecológicos de la sobre-pesca

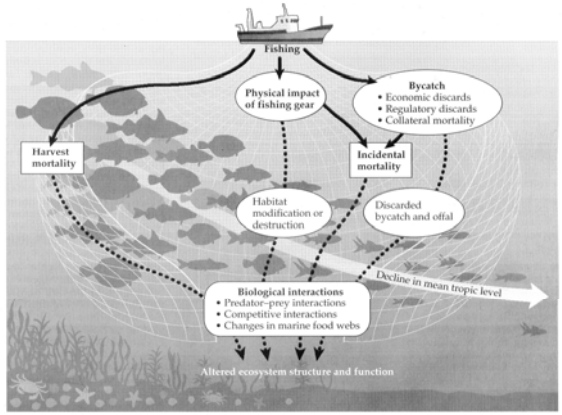


Figure 8 The ecological effects of ecosystem over-fishing. (Modified from The Pew Oceans Commission 2003.)

El Golfo de Maine

Figure C The Gulf of Maine. (Modified from the USGS and The Woods Hole Field Center.)

El consejo del Golfo de Maine realiza planificación y manejo basada en ecosistemas, definido como "manejo colaborativo que integra los valores y objetivos económicos y ecológicos, enfatizando límites naturales más que los políticos"

Modelo de Holling's

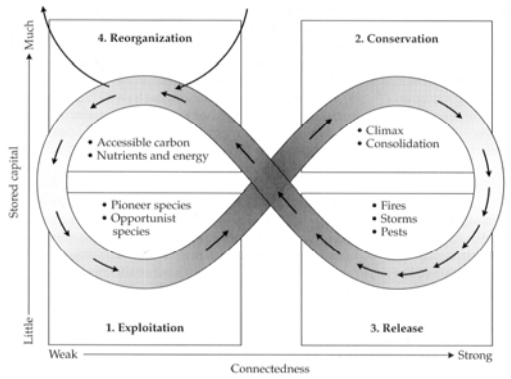


Figure 13.6 Holling's model: the functional stages of ecosystem development and the flow of events between them. (Modified from Holling 1992.)

Resiliencia: magnitud de una perturbación que un ecosistema puede absorber antes que su estructura se cambia a un estado diferente (Holling 1973, 1986)

Manejo Adaptativo

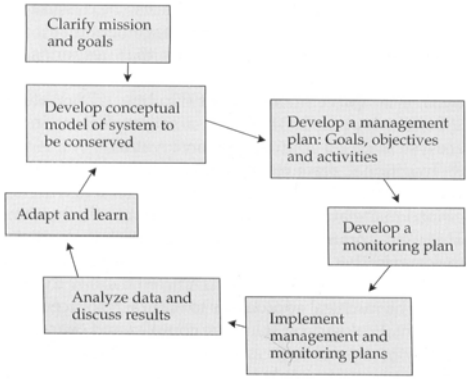


Figure 13.7 The adaptive management cycle allows for continual monitoring and refinement of management objectives. (Modified from Margoluis and Salafsky 1998.)

Acercamiento analítico usado en el manejo adaptativo

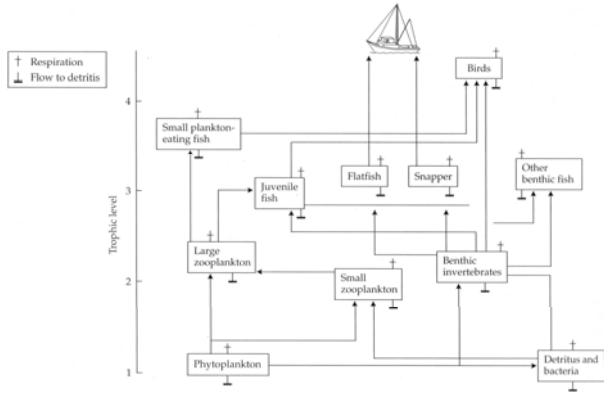


Figure 13.8 Ecopath and other mass balance models are often developed to include trophic groups of species and their connections to one another, and to human effects on them through environmental change and direct exploitation. In this model, the effects of human exploitation of two groups of species (flatfish and snapper) on the entire ecosystem can be evaluated.

El rol crítico de procesos de toma de decisión participativos

TABLE 13.3 *A Stereotyped Presentation of Three Types of Organizations and How They Handle Information and Responsibilities*

Pathological organization	Bureaucratic organization	Generative, adaptive, or progressive organization
The organization doesn't want to learn new information	The organization may not learn new information	The organization actively seeks information
Messengers are "shot" (i.e., treated poorly)	Messengers are listened to—if they arrive	Messengers are trained
Responsibility is shirked	Responsibility is compartmentalized	Responsibility is shared
Bridging is discouraged	Bridging is allowed but neglected	Bridging is rewarded
Failure is punished or covered up	Organization is just and merciful	Failure results in learning and redirection
New ideas are crushed	New ideas present problems	New ideas are sought and welcome

Source: Modified from Westrum 1994.

Blanqueamiento de los corales:
el manejo de la resiliencia en un mundo cambiante

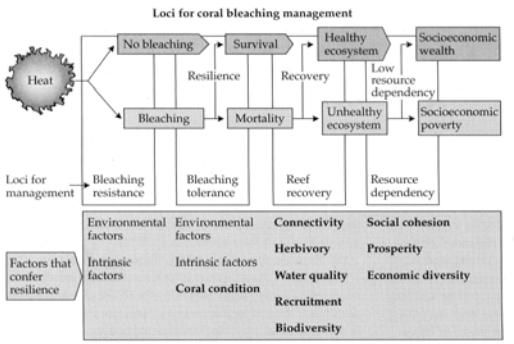


Figure A Management can aim to build resilience to mass coral bleaching in four key areas: bleaching resistance, bleaching tolerance, reef recovery, and reef resource dependency by humans. Factors that confer resilience are listed in the diagram; those shown in bold can be directly promoted through management interventions while the rest can be utilized in management interventions even though they cannot be directly controlled or enhanced. (Modified from Obura 2003.)

Identifying Resilient Reefs

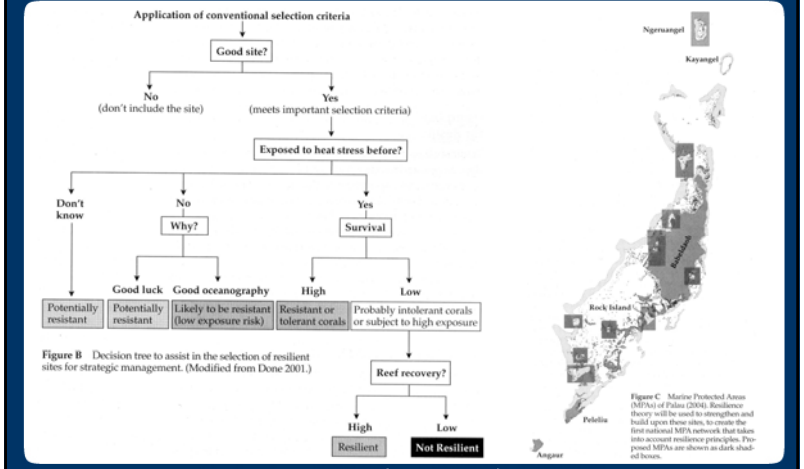


Figure B Decision tree to assist in the selection of resilient sites for strategic management. (Modified from Done 2001.)

Figure C Marine Protected Areas (MPAs) of Palau (2004). Resilience theory will be used to strengthen and build upon these sites, to create the first national MPA network that takes into account resilience principles. Proposed MPAs are shown as dark shaded boxes.

Restauración luego de sobre-explotación

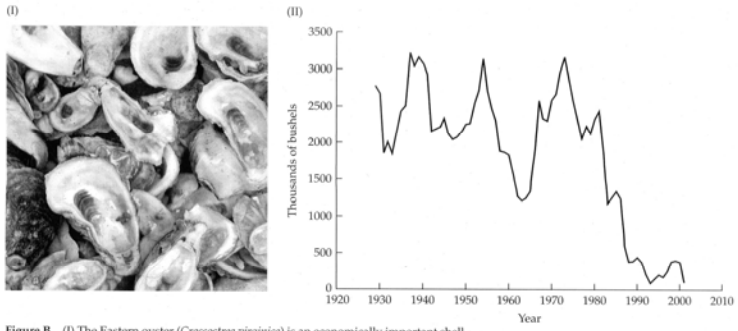


Figure B (I) The Eastern oyster (*Crassostrea virginica*) is an economically important shellfish. Creating a sustainable harvest of this species is a major focus of ecosystem management in Chesapeake Bay. (II) Quantities of native oysters gathered per year has fallen precipitously since 1970. (I, Photograph © David Sieren/Visuals Unlimited; II, modified from Maryland Department of Natural Resources 2005.)

Procesos a diferentes escalas de el tiempo y espacio

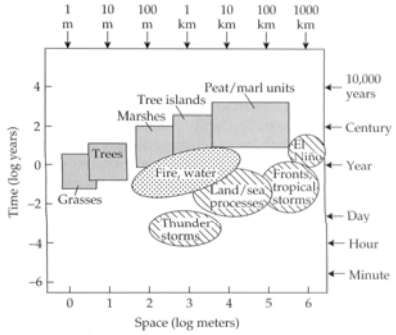


Figure A Spatial and temporal domains of critical ecosystem components in the Everglades. The squares represent the domains within a vegetation hierarchy of individual plants, associations, and landscape units. The crosshatched ellipses represent the atmospheric hierarchy, the primary sources of water input. Fires and surface water conditions are in an intermediate position, and integrate the vegetation and atmospheric hierarchies. (Modified from Light et al. 1995.)

Del lagarto al sistema hidrológico

Figure B Aerial photograph (10 mile window) showing the landscape mosaic in a conserved area (Everglades National Park) at the scale of a single alligator hole. (Photograph courtesy of the South Florida Water Management District.)

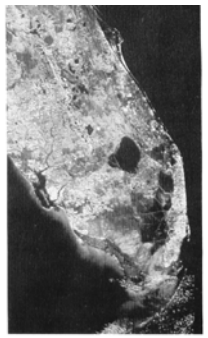
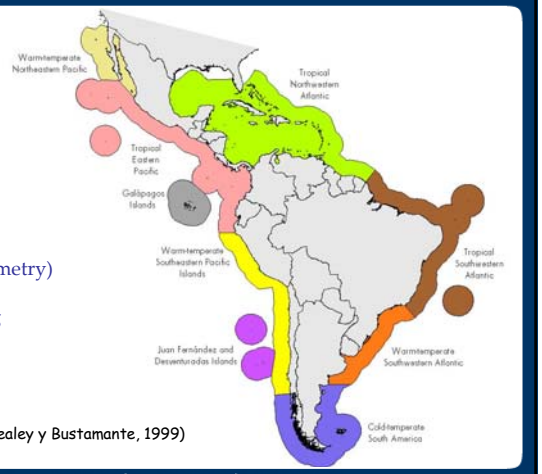


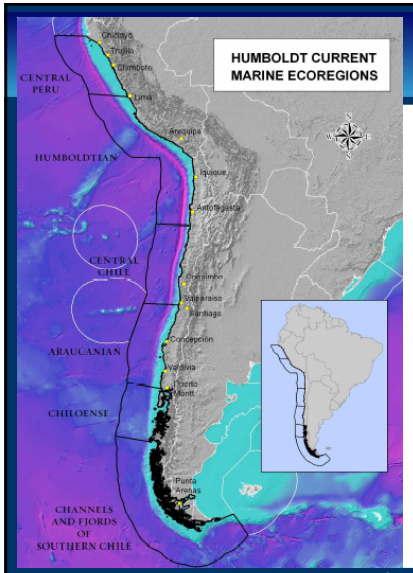
Figure C A satellite image of South Florida, showing the hydrologic system of the Everglades and current land uses. The Everglades was once the southern third of a hydrologic system that included the Kissimmee River Basin and Lake Okeechobee (the large lake near the center of the photograph). Land uses of the Everglades ecosystem are indicated by the Everglades Agriculture Area in the north, Water Conservation Areas (dark areas), urban development along the east coast, and the national park and preserve in the south. (Photograph courtesy of the South Florida Water Management District.)

Provincias biogeográficas costeras



Criteria:
- Continental shelf (bathymetry)
- Sea surface temperature
- Ocean current upwelling

(Sullivan-Sealey y Bustamante, 1999)



Ecoregiones Marinas
(Sullivan-Sealey y Bustamante, 1999):

1. Perú Central, 6°S a 12°S
2. Humboldt, 12°S a 25°S
3. Chile Central, 25°S a 33°S
4. Araucana, 33°S a 41°S
5. Chiloense, 41°S a 47°S
6. Canales y Fiordos del Sur de Chile, 47°S a 56°S

Ranking de valor biológico

#	INDICATORS	Ecoregion: Gulf of Mexico Data	Rank	South Florida Data	Rank	Bahamian Data	Rank
	PHYSICAL CONDITIONS						
1	Coastline extension (km)		M		L		M
2	Shelf width (min-max./mean)		H		M		M
3	Shelf area (km²)		H		L		M
4	Presence of outstanding communities (mangrove/kelp forests, coral reefs, barrier/atoll reef formations, upwellings, etc.)		L		H		H
5	Coral reef extension (% of the total coastline extension)		L		H		H
6	Mangrove extension (% of the total coastline extension)		M		M		M
7	Kelp forest extension (% of the total coastline extension)						
8	Position relative to the ocean current (upstream, downstream, midstream)		L		L		M
9	Number of rivers per 100 km of coastline						
10	% estuaries/rias/deltas on overall number of rivers						
	SPECIES COMPOSITION						
	Fishes						
11	# of neritic teleost species	383	M	750	H	488	M
12	# of neritic Perciformes species						
13	# of species of selected families (Serranidae, Lutjanidae, Carangidae, Pomacentridae, Scaridae, Haemulidae, Labridae)						
	Invertebrates and macroalgae						
14	# of spp./genera/families of selected groups of coastal mollusks ** (need more data)	337 bivalves		634 bivalves + gastropods (shallow water only)			
15	# of families of benthic macroalgae						
16	# of species of selected macroalgae families ** (need more data)	323		400+		99 (E)	
17	total # of stony coral species (Hermatypic)	36	M	62	H	61	H
	Marine Mammals						
18	total # of species (31 spp. overall)	18	M	18	M	18	M
19	# of species of selected groups						
	Seabirds						
20	# of species/genera of selected groups	44		28		34	
21	# of families of selected groups						

	SPECIES COMPOSITION				
	Sea Reptiles				
22	# of species of sea turtles and crocodiles	5 turtles H 1 crocodiles		5 turtles H 1 crocodile	5 turtles H 2 crocodiles
	ABUNDANCE				
23	# of individuals of manatee (H = thousands, L = hundreds or less)	L		H	L
24	Annual catch for selected groups (tons)				
	Total	40,000	M	17,000 L	10,000 L
	Finfish	18,000	M	9,000 M	1,500 L
	Shrimp	16,000	M	2,360 M	not loaded L
	Lobster		L	3,000 M	8,200 H
	BREEDING				
25	Presence of breeding/nesting sites for selected fish/seabird/sea reptile species/genera # of species of nesting turtles	3	L	4 M	4 M
	ENDEMISM				
26	# endemic species for the Biogeographic Province				
	FISHERIES RESOURCES				
27	# of finfish species that are commercially significant				
28	# of species of mollusks that are commercially significant	4	H	2 L	3 L
29	# of species of crustaceans that are commercially significant	19	H	14 M	4 L
30	# of genera of macroalgae that are commercially significant				
	Total High Points			18	18	15
	Total Medium Points			14	16	16
	Total Low Points			6	5	6
	Grand Total			**38**	**39**	**37**

Note: High = 3 points, Medium = 2 points, Low = 1 point

Matrices de ranking

Table 2.5 Example of ranking matrices: Tropical Northwestern Atlantic Province. Higher rank of conservation status means a higher degree of threats.

Biological and Ecological Value	Gulf of Mexico	South Florida	Bahamian	Central Caribbean	Lesser Antilles
Score	38	38	37	56	27
Ordinal Rank	2	2	3	1	4
H,M,L Rank	M	M	M	H	L

Conservation Status	Gulf of Mexico	South Florida	Bahamian	Central Caribbean	Lesser Antilles
Score	38	32	18	44	41
Ordinal Rank	3	4	5	1	2
H,M,L Rank	M	M	L	H	H

Matrix based on ordinal 1-5 rank:

Biological Value \ Conservation Status	1	2	3	4	5
1	Central Caribbean				
2			Gulf of Mexico	South Florida	
3					Bahamian
4		Lesser Antilles			
5					

1= High Value/Priority, 5= Low Value/Priority

Alternate matrix based on High, Medium, Low rank:

Biological Value \ Conservation Status	H	M	L
H	Central Caribbean		
M		Gulf of Mexico, South Florida	Bahamian
L	Lesser Antilles		

(Sullivan-Sealey y Bustamante, 1999)

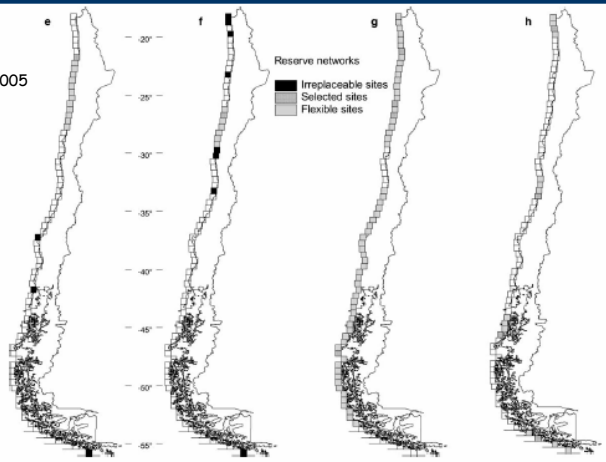
Regiones con alta prioridad de conservación

(Sullivan-Sealey y Bustamante, 1999)

Doctorado en BIOLOGÍA y ECOLOGÍA APLICADA

Conservación de vertebrados marinos costeros

Tognelli et al. 2005

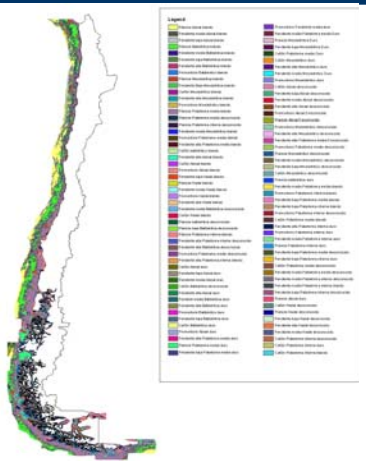


Doctorado en BIOLOGÍA y ECOLOGÍA APLICADA

Clasificación de sistemas bentónicos y priorización de ecoregiones marinas, Perú y Chile

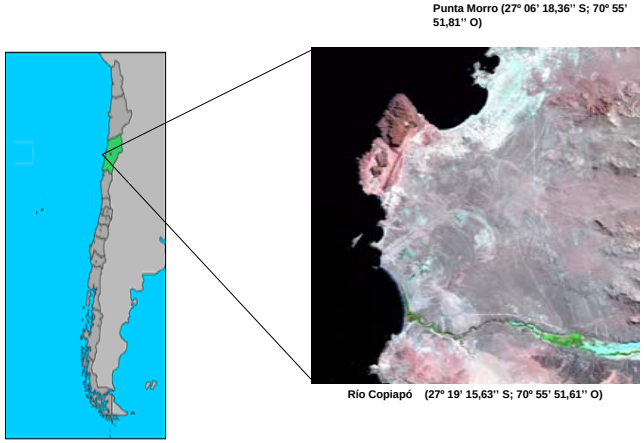
The Nature Conservancy

SAVING THE LAST GREAT PLACES ON EARTH

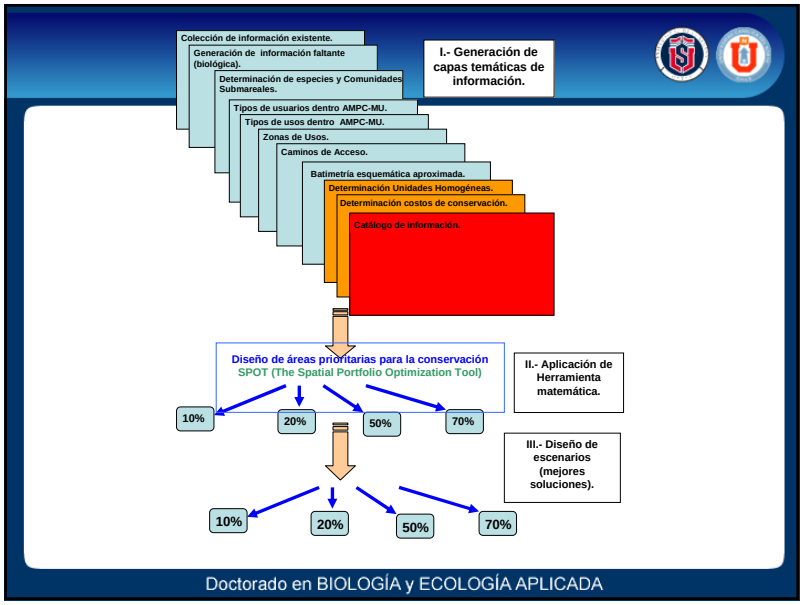


Doctorado en BIOLOGÍA y ECOLOGÍA APLICADA

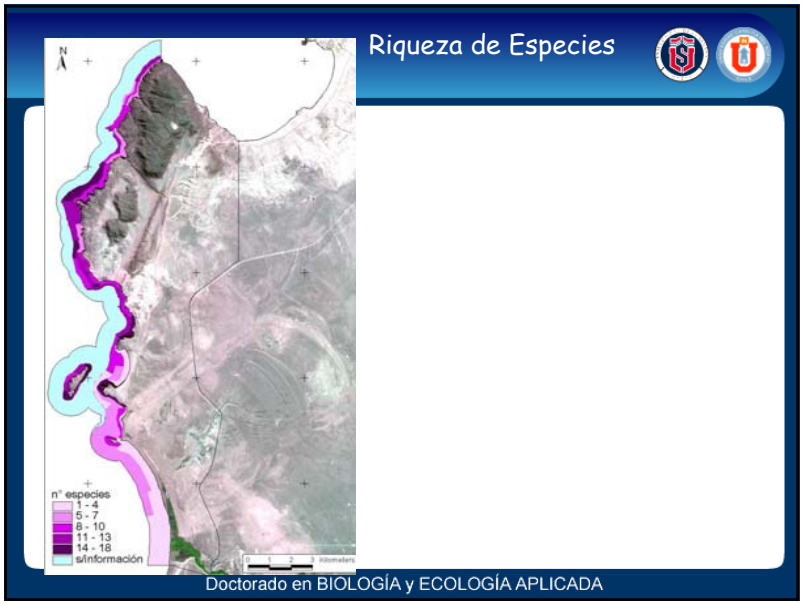
Selección de Zonas con Alta Prioridad de Conservación dentro de un Área Marina Costera Protegida de Múltiples Usos (AMCP-MU) en la III Región de Atacama, Chile

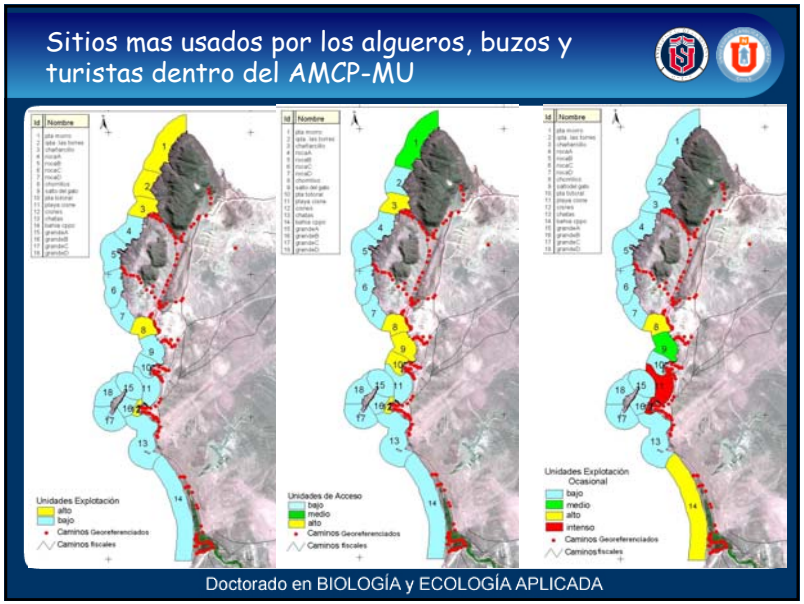


Doctorado en BIOLOGÍA y ECOLOGÍA APLICADA

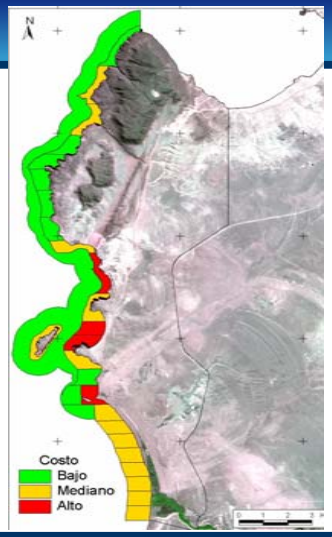

Colección de información existente.
Generación de información faltante (biológica).
Determinación de especies y Comunidades Submareales.
Tipos de usuarios dentro AMPC-MU.
Tipos de usos dentro AMPC-MU.
Zonas de Usos.
Caminos de Acceso.
Batimetría esquemática aproximada.
Determinación Unidades Homogéneas.
Determinación costos de conservación.
Catálogo de información.
I.- Generación de capas temáticas de información.
Diseño de áreas prioritarias para la conservación
SPOT (The Spatial Portfolio Optimization Tool)
II.- Aplicación de Herramienta matemática.
10%
20%
50%
70%
III.- Diseño de escenarios (mejores soluciones).
10%
20%
50%
70%
Doctorado en BIOLOGÍA y ECOLOGÍA APLICADA


COMUNIDADES SUBMAREALES
Comunidades
Algas Erectas
Cirripedios
Comunidad de Lessonia
Fondos Blandos Intermedio
Fondos Blandos Profundos
Fondos Blandos Somero
Fondos Blanqueados Profundos
Fondos Blanqueados Someros
Phragmatopoma
Playa Arenosa Costera
Pyure
s/información
Doctorado en BIOLOGÍA y ECOLOGÍA APLICADA


Riqueza de Especies
n° especies
1 - 4
5 - 7
8 - 10
11 - 13
14 - 18
s/información
Doctorado en BIOLOGÍA y ECOLOGÍA APLICADA

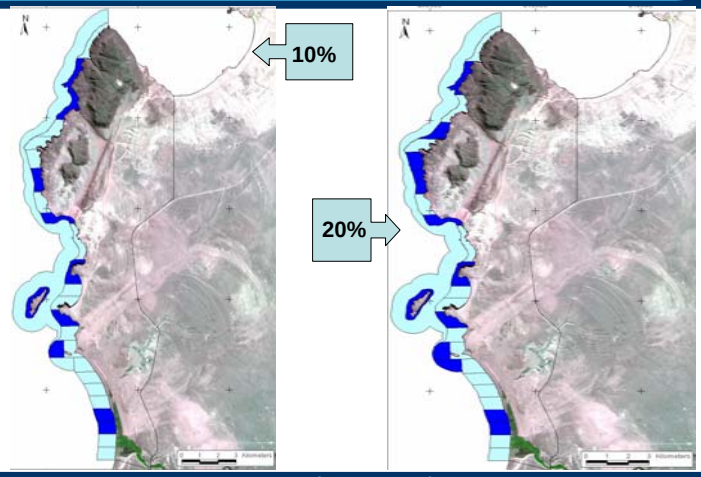

Sitios mas usados por los algueros, buzos y turistas dentro del AMCP-MU
Unidades Explotación
alto
bajo
Caminos Georeferenciados
Caminos fiscales
Unidades de Acceso
bajo
medio
alto
Unidades Explotación Ocasional
bajo
medio
alto
intenso
Doctorado en BIOLOGÍA y ECOLOGÍA APLICADA

COSTOS DE CONSERVACIÓN

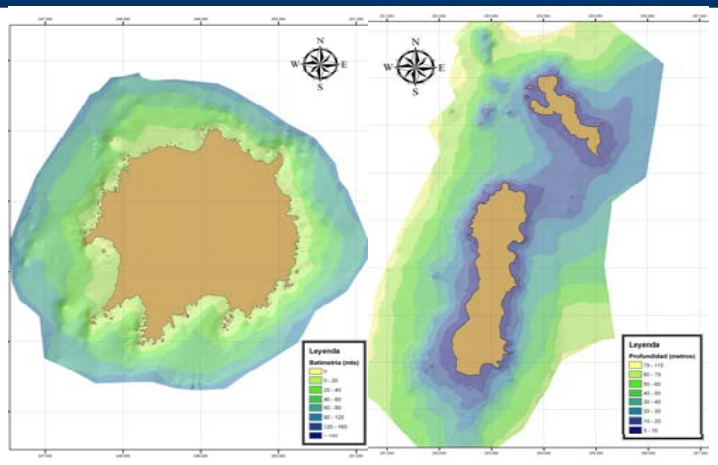


- Buzos
- Pescadores
- Algueros
- Turistas

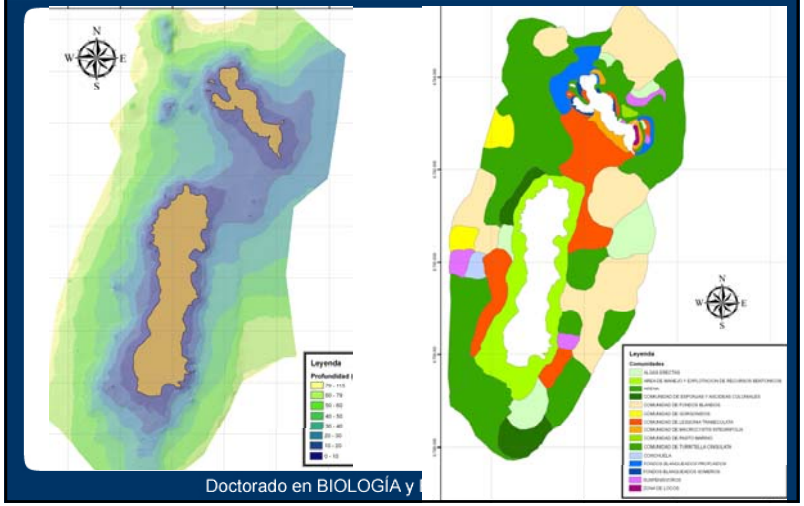
Mejores soluciones con SPOT (spatial portofolio optimization tool)



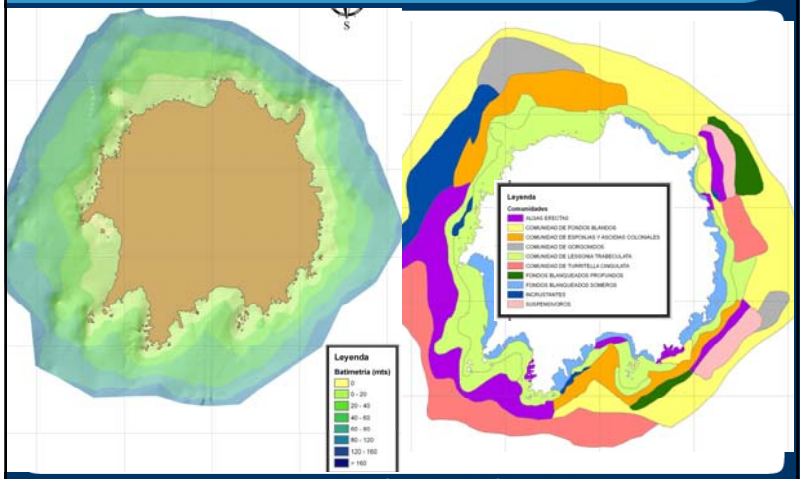
Reservas marinas



Comunidades submareales

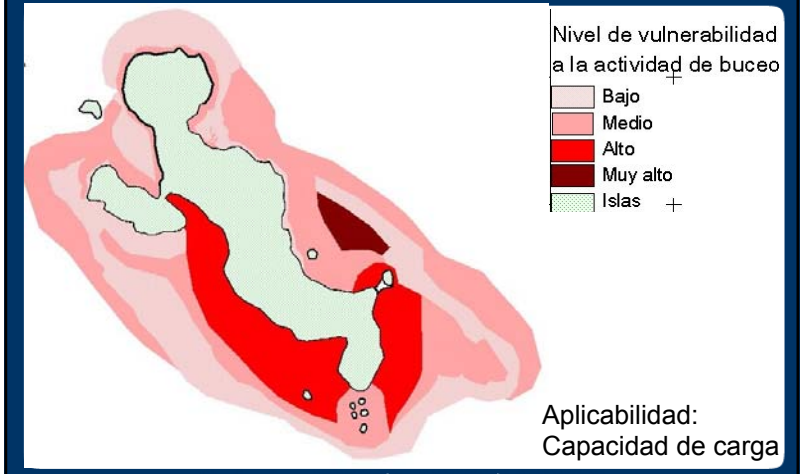


Comunidades submareales



Doctorado en BIOLOGÍA y ECOLOGÍA APLICADA

Vulnerabilidad de comunidades



Doctorado en BIOLOGÍA y ECOLOGÍA APLICADA

Leer

Groom MJ, GK Meffe y CR Carroll. 2006. Principles of Conservation Biology. Third Edition. Sinauer Associates, Inc., Sunderland, Massachusetts. Capítulo 13: Ecosystem Approaches to Conservation

Ver también: www.sinauer.com/groom

Doctorado en BIOLOGÍA y ECOLOGÍA APLICADA