

Conservation Effectiveness Data Exchange Standards¹

A Proposal for Linking Databases of Conservation Actions and Projects

Draft Version: September 2008

¹ This is just a working title. Some other options include:

- Conservation Effectiveness Data Exchange (CEDEx) Standards
- Conservation Data Exchange (ConDEx) Standards
- Conservation Network Exchange (Con-NEEx) Standards
- Conservation Knowledge Exchange (Con-NEEx) or (Con-KnEx) Standards
- Insert Your Winning Name Here

Contents

1. Introduction	1
1.1 Problem Statement	1
1.2 Some Key Definitions	1
1.3 Who We Are.....	2
1.4 Our Vision	3
1.5 Conservation Data Exchange Standards	3
2. Proposed Common Data Fields	4
2.1 Basic Information	4
Location	4
Contact Person.....	5
Data Entry.....	5
Reference	5
Project Information	6
2.2 Standard Information About Each Action	6
Action.....	6
Conservation Target(s): Habitats and Species	7
Direct Threat(s).....	7
Contributing Factor(s).....	8
Monitoring Design.....	8
3. Database Access Rights	9
4. Search Portal Specifications	9
5. Conclusion	9
Annex 1. IUCN Habitat Classification	10
Annex 2. IUCN-CMP Unified Classification of Direct Threats, v 1.1	13
Annex 3. IUCN-CMP Unified Classification of Conservation Actions, v 1.1	15

About this Document

This document is currently being developed by the **CEDEX** Consortium which includes members of the Conservation Measures Partnership, the Centre for Evidence Based Conservation, ConservationEvidence.com, and the Society for Conservation Biology.

Please contact CEDEX@conservationmeasures.org for more info about this document.



This work is licensed under the Creative Commons Attribution-Noncommercial-Share Alike 3.0 License. To view a copy of this license, visit <http://creativecommons.org/licenses/by-nc-sa/3.0/>.

1. Introduction

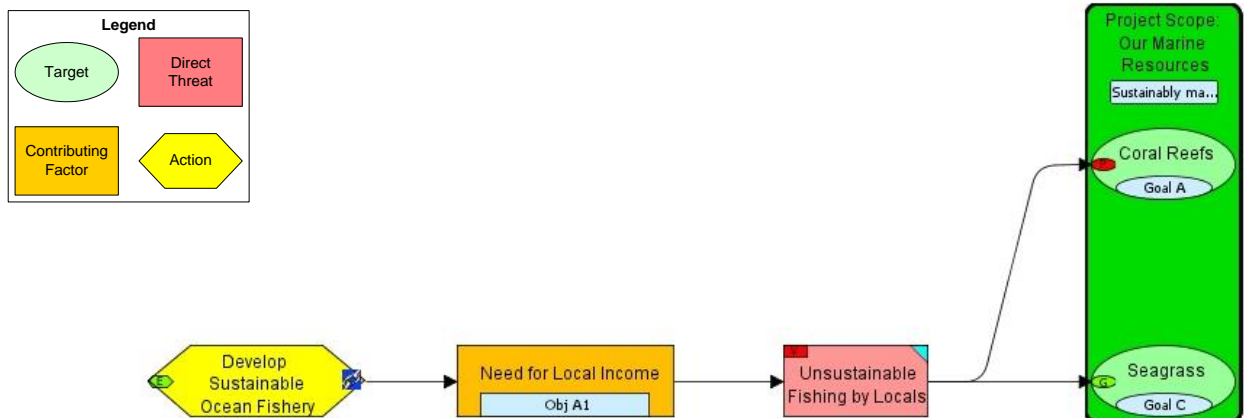
1.1 Problem Statement

- Conservation is an action-oriented discipline. Conservation practitioners are using and gaining experience about their strategies and actions every day.
- Much of what they learn is either never written down, or is not shared beyond the project team or (at best) their organization.
- Practitioners need tools to support collaboration & learning:
 - identify people with relevant experience
 - facilitate sharing information and expertise within and across organizations
 - link project needs with donor interests
- There are a number of efforts to develop online databases of conservation practice. But a hodge-podge of incompatible databases would be of limited utility beyond one organization.
- The time is ripe to catalyze formation of a coalition of leading groups to create if not one global database of conservation projects & practice, then at least a set of common data standards to link these efforts.

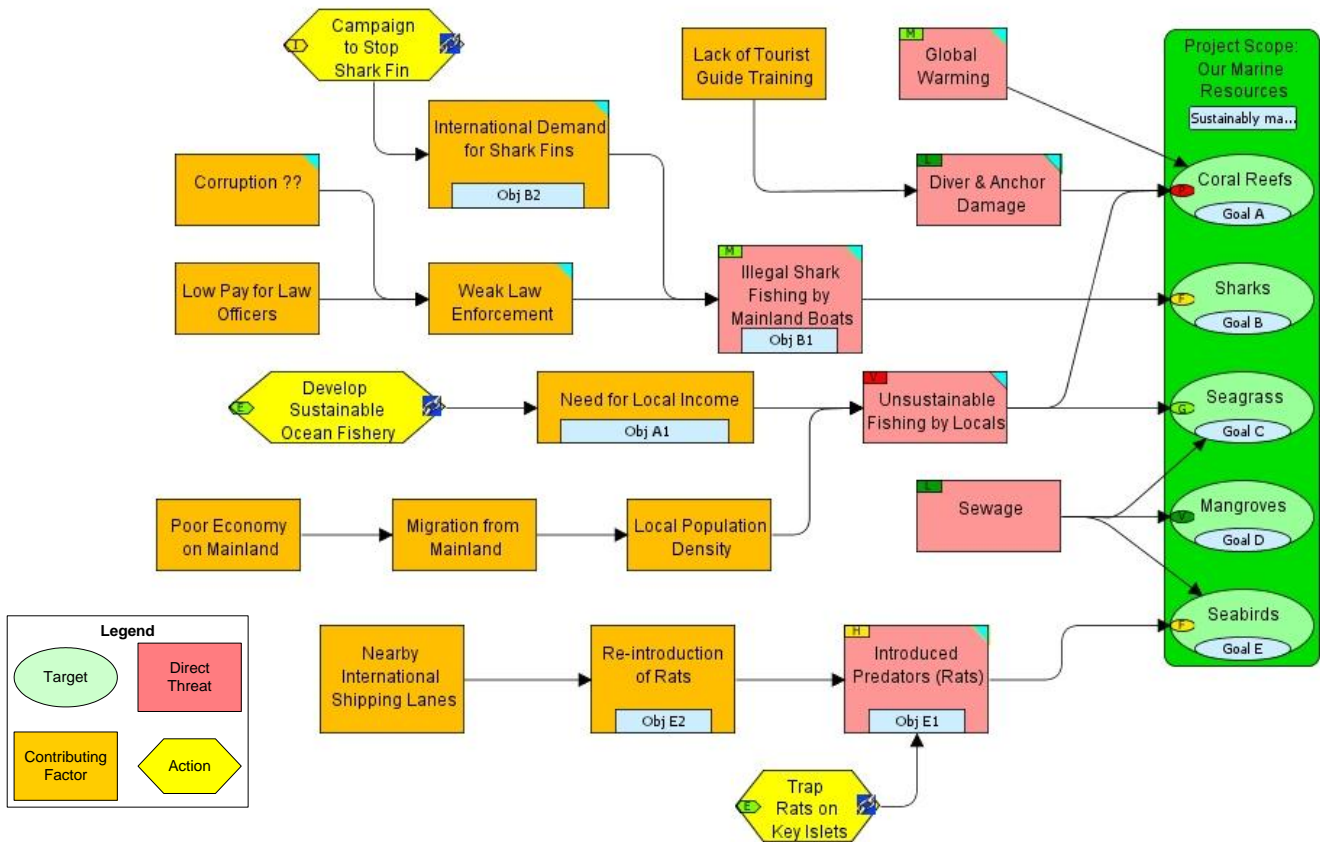
1.2 Some Key Definitions

Some key terms that we use in this document include:

- **Conservation Practitioner** – Any individual involved in designing, managing, monitoring, and/or learning about conservation actions and projects. Examples of conservation practitioners include protected area managers, local community members, NGO or land trust staff, applied researchers, donors, and interested citizens.
- **Conservation Action** – An intervention designed to reach a project’s objectives and ultimate conservation goals. For example using herbicide to treat an invasive species, establishing a ecotourism business to provide alternative income to fishermen, or setting up a protected area to protect the breeding area of a bird species. “Actions” are roughly synonymous with *strategies, interventions, activities, responses, and measures* (in the action sense, not the monitoring sense). An example of one broad action – developing a sustainable ocean fishery to provide income for fishermen – is shown in the following diagram:



- Conservation Project** – For the purposes of this exercise, a project is “any set of actions undertaken by a group of people and/or organizations to achieve defined goals and objectives.” Projects can range in scale from efforts by local people to protect a small sacred grove to management of a provincial or national park to a global funding program to protect the world’s oceans. Projects thus consist of one or more sets of actions as shown in the following diagram:



1.3 Who We Are

We are a coalition of key conservation practitioners and researchers:

- Conservation Evidence** – Key representatives of a movement towards evidence based conservation including ConservationEvidence.com and the Center for Evidence Based Conservation.
- Conservation Measures Partnership** – A consortium of conservation organizations including WWF, The Nature Conservancy, Wildlife Conservation Society, Africa Wildlife Foundation, Conservation International, Foundations of Success, IUCN, National Fish and Wildlife Foundation, and RARE Conservation. This consortium developed the CMP Open Standards for the Practice of Conservation and are currently developing Miradi Software.
- The Nature Conservancy** – Currently manages ConserveOnline as well as the ConPro Database.
- Society for Conservation Biology** – The leading global academic society in conservation.

1.4 Our Vision

A few years from now, a conservation practitioner anywhere in the world will be able to go online and immediately access information about the specific experiences of fellow practitioners from around the world as well as contribute his or her own experiences. In particular, the practitioner will be able to search for specific conservation actions and will be able to learn the conditions under which the action was applied, the results of the action (both successes and failures), and any lessons that emerged. Practitioners will also be able to select any given location and learn about the specific conservation projects taking place there.

For example, suppose a team of protected area managers has tried two conservation actions. In one case, they applied an herbicide at varying intervals to control an invasive weed and in another, they have tried to set up an ecotourism business to provide alternative income for local residents involved in destructive logging operations. They found that the weed action was highly effective (once they figured out that they needed to apply the herbicide in fall when the plant was pulling nutrients down into its roots), but the tourism action didn't work at all.

If this team can post their results online in a format that can be easily scanned and reviewed by others, then other practitioners around the world that are facing this weed at their site, or are contemplating using ecotourism can search the databases and find these results and learn from them. Furthermore, if there is a group that is interested in conducting a systematic review of the conditions under which the herbicide is effective or whether tourism works to reduce logging, then this group will have access to the original study that they can then add to their analyses.

Throughout this process, the protected area managers retain full control over the data that they contribute to the online records. Furthermore, the system is set up in such a way that it only requires minimal effort for them to contribute and update their results. Finally, the system also enables the project to post their conservation needs, and as a result, to “market” these needs to donors who might potentially be interested in providing support.

1.5 Conservation Data Exchange Standards

To achieve the above vision, we do not have to develop one standard database to which all practitioners have to contribute their information. Instead, we merely need to develop and implement a set of standards that govern the exchange of data among databases around the world. In particular, these standards have three parts:

- **Common Data Fields** – The fields that needs to be collected for each action and/or project.
- **Database Access Rights** – The terms that participating databases must agree regarding the mutual exchange of information.
- **Search Portal** – The requirements for a portal that users can employ to search all participating databases.

In the remainder of this document, we provide a bit more detail about each of these three parts.

2. Proposed Common Data Fields

The following lists the proposed data fields that could potentially be collected in common across all databases of conservation actions. It is subdivided into the data that would be collected for each “project” and the data that would be collected for each specific “action.” In each table, the columns are defined as:

Field – The specific data field name

Priority – The importance of collecting this data on a 1-4 scale where:

4	Mandatory – Must be filled out for all records
3	Highly Recommended – Should be filled out for all records
2	Useful – Desirable for all records
1	Exploratory – Under development

Type – The type of data in the field (text, drop-down list, date, numerical, URL, image)

Comment – Additional info

Note that for this effort to be effective, participating organizations would have to agree on the list values to use (for fields restricted to a predefined set of values) as well as the fields themselves.

2.1 Basic Information

This section describes the basic information required about each entry. It will often be replicated across multiple actions being implemented by a given project and as such, we need to develop a way to avoid having to re-enter this info each time.

Location

Description: The political unit(s) where the action is taking place.

Field	Priority	Type	Comments
Country(s)	4	list	Allow multiple selection; based on standard UN lists
State or Province	3	text	Allow multiple selection; ideally should be standardized lists, perhaps with “other” option
Latitude / Longitude	3	num	Centroid location of the action
Location Detail	2	text	Additional description of location

Additional Comments: The latitude / longitude can be used to locate the action on a global map.

Contact Person

Description: The individual who is the key source for more information about the action.

Field	Priority	Type	Comments
Contact First Name(s)	4	text	
Contact Surname	4	text	
Contact Position	3	text	
Contact Organization	3	text	
Contact E-Mail	4	text*	see discussion below
Contact Current as of Date	4	date	

Additional Comments: People may be reluctant to post e-mail on open website because of spam potential. May have to create private registry for folks to get e-mail. Or click to send e-mail to this person. Needs to have option to rapidly copy or clone information about person entering data to save time.

Data Entry

Description: Information about the person entering data about the action. Often will be same as the contact person.

Field	Priority	Type	Comments
Entry First Name(s)	3	text	
Entry Surname	3	text	
Entry E-Mail	3	text*	see discussion below
Date of Data Entry	4	date	

Additional Comments: People may be reluctant to post e-mail on open website because of spam potential. May have to create private registry for folks to get e-mail. Or click to send e-mail to this person. Needs to have option to clone info from contact person fields to save time.

Reference

Description: Where to go for additional detail about the action and the results.

Field	Priority	Type	Comments
Reference Type	4	list	Single selection; list includes peer reviewed paper, book or chapter, report, website, other
Reference Citation	4	text	Probably need to break into author, year, title, publisher, journal, etc. subfields
Reference URL	4	URL	Location of reference on web
Additional Data URL	2	URL	Location of data sets on web
Reference Detail	2	text	Additional info about reference

Additional Comments: Need to figure out how to handle multiple references. We also need to decide whether we need separate fields for citation info.

Project Information

Description: Information about the “project” that is implementing the action. For the purposes of this exercise, a project is “any set of actions undertaken by a group of people and/or organizations to achieve defined goals and objectives.” Projects can range in scale from efforts by local people to protect a small sacred grove to management of a provincial or national park to a global funding program to protect the world’s oceans.

Field	Priority	Type	Comments
Project Name	2	text	
Implementing Organizations	2	text	Can we standardize?? Do we need to distinguish the lead org??
Project Description	2	text	A 1-2 paragraph description
Project Needs	1	text	A description of project financial/other resource needs for potential donors

Additional Comments: This information will be valuable to expand the database of actions to be a database of conservation projects around the world.

2.2 Standard Information About Each Action

This section describes the basic information required about each action. Actions take place in the context of a “chain” as shown in the following figure:



Action

Description: Interventions designed to reach a project’s objectives and ultimate conservation goals. For example using herbicide to treat an invasive species, establishing an ecotourism business, or setting up a protected area. As indicated by the box in Figure 1, actions can be applied to contributing factors, direct threats, or directly to the targets themselves. “Actions” are roughly synonymous with *strategies*, *interventions*, *activities*, *responses*, and *measures* (in the action sense, not the monitoring sense).

Field	Priority	Type	Comments
Action Type	4	list	Single selection; Based on IUCN-CMP Actions Classification, Level 2
Action Name	4	text	Equivalent of IUCN-CMP Level 3
Action Scale	3	text	Scope of the action
Action Cost	3	text	Cost per action (per year if needed, or perhaps for initial & subsequent years); Standard currency (\$ or € or other)
Objective(s)	2	text	The specific objectives that project wants to achieve with the action
Action Detail	2	text	Additional description of action

Additional Comments: Unlike other factors, this will be single selection. We will need to figure out how to handle the issue of other confounding actions. We will also have to provide guidance to screen out basic adaptive management actions (e.g., fundraising, strategic planning) that every project needs to undertake. At the moment, Level 3 of the IUCN-CMP classification (see Annex 3) is not standardized so this will have to be a text field, but this might be an impetus to try to develop a more standard list.

Conservation Target(s): Habitats and Species

Description: The biological entities (species/communities or habitats/ecosystems) that a project is trying to conserve with a given action. For example, a population of a specific fish species or a forest ecosystem. Synonymous with *conservation targets*, *biodiversity features*, and *focal targets*. Note that not all actions will be targeted at specific species, but the habitat should be recorded even for species targets.

Field	Priority	Type	Comments
Habitat Type	4	list	Multiple selection; Based on IUCN Habitat Classification List
Species	3	text	The scientific and common names of the species
Listing Status of Species	2	list	Degree to which species is endangered (using IUCN Red List)
Habitat Detail	2	text	Additional description of habitat

Additional Comments: We need to decide how fine-grained we want to make this list. See Annex 1 for a list of the IUCN Habitats. We also need to figure out how we will handle species guilds and communities.

Direct Threat(s)

Description: The proximate human activities or processes that have caused, are causing or may cause the destruction, degradation and/or impairment of biodiversity and natural processes. In other words, the problem that the conservation action is ultimately designed to address. For example, unsustainable fishing or logging. Threats can be past (historical), ongoing, and/or likely to occur in the future. Synonymous with *sources of stress* and *proximate pressures*.

In addition to recording the name of the direct threat, we may also eventually give people the option to record the *magnitude* of the threat following the IUCN-CMP system currently being developed.

Field	Priority	Type	Comments
Threat Type	4	list	Multiple selection; Based on IUCN-CMP Threats Classification, Level 2
Threat Name	4	text	Equivalent of IUCN-CMP Level 3
Threat Magnitude	1	text	Scope of the action
Action Detail	2	text	Additional description of action

Comments: At the moment, Level 3 of the IUCN-CMP classification (see Annex 2) is not standardized so this will have to be a text field, but this might be an impetus to try to develop a more standard list.

Contributing Factor(s)

Description: Factors, usually social, economic, political, institutional, or cultural, that enable or otherwise add to the occurrence and/or persistence of direct threats. There is typically a chain of contributing factors behind any given direct threat. In a situation analysis, these factors are often subdivided into *indirect threats* (factors with a negative effect) and *opportunities* (factors with a potential positive effect). For example, market demand for fish (an indirect threat) or a country's land use planning system (an opportunity). Synonymous with *drivers* or *root causes*.

Field	Priority	Type	Comments
Contributing Factors	2	text	Eventually, we may have standard list
Conceptual Model or Results Chain	2	image or mpz	A graphical representation of the chain linking the action to the conservation situation

Comments: These are very difficult to record in any standard fashion. As such, it is probably best if people just capture the results chain in a picture or in Miradi format.

Monitoring Design

Description: The type of monitoring design used to collect information about the results of the intervention. This field enables users to stratify their query to allow for differing degrees of rigor. Monitoring designs can include:

- anecdote
- pre-test/post-test observation
- time series observations
- comparison groups
- replicated experiment
- randomized replicated controls

Field	Priority	Type	Comments
Monitoring Design Type	4	list	Single selection
Monitoring Design Detail	2	text	A more detailed description
Monitoring Design Indicators	2	text	A description of the indicators collected
Monitoring Design Spatial Data	2	list	Single selection; degree to which data is georeferenced (all data, some data, none)
Monitoring Design Spatial Data	2	url	A link to where spatial data can be obtained

Additional Comments: There are two dimensions here: cross-sectional and time series – we may have to allow folks to record both.

3. Database Access Rights

This section will contain a description of the proposed database access rights. Key aspects might include:

- To be in compliance with standards, a database would have to make all project related data available to all interested folks.
- Data on any given site would be treated as “published.” This means that other folks could then use the data in analyses, but would have to give credit to the sources.
- We might want to explore appropriate creative commons licenses.
- Donors could potentially require grantees to post their results on a certified database.
- Publishers could potentially require authors to post their results on a certified database as well.

4. Search Portal Specifications

This section will contain a description of the search portal specifications.

5. Conclusion

We believe that the Common Data Fields, Database Access Rights, and Search Portal as outlined above will help us to achieve our vision. Ultimately, this effort will enable:

- Practitioners in field to plan and implement more effective projects,
- Managers and donors to get better information to improve their work,
- All stakeholders learning from each other,
- Increased public support for conservation,
- Ultimately, better conservation outcomes.

Annex 1. IUCN Habitat Classification

The following is a draft version that has not yet been finalized.

#	Description
1	Forest
1.1	Forest - Boreal
1.2	Forest - Subarctic
1.3	Forest - Subantarctic
1.4	Forest - Temperate
1.5	Forest - Subtropical/Tropical Dry
1.6	Forest - Subtropical/Tropical Moist Lowland
1.7	Forest - Subtropical/Tropical Mangrove
1.8	Forest - Subtropical/Tropical Swamp
1.9	Forest - Subtropical/Tropical Moist Montane
2	Savanna
2.1	Savanna - Dry
2.2	Savanna - Moist
3	Shrubland
3.1	Shrubland - Subarctic
3.2	Shrubland - Subantarctic
3.3	Shrubland - Boreal
3.4	Shrubland - Temperate
3.5	Shrubland - Subtropical/Tropical Dry
3.6	Shrubland - Subtropical/Tropical Moist
3.7	Shrubland - Subtropical/Tropical High Altitude
3.8	Shrubland - Mediterranean-type Shrubby Vegetation
4	Grassland
4.1	Grassland - Tundra
4.2	Grassland - Subarctic
4.3	Grassland - Subantarctic
4.4	Grassland - Temperate
4.5	Grassland - Subtropical/Tropical Dry
4.6	Grassland - Subtropical/Tropical Seasonally Wet/Flooded
4.7	Grassland - Subtropical/Tropical High Altitude
5	Wetlands (inland)
5.1	Wetlands (inland) - Permanent Rivers/Streams/Creeks (includes waterfalls)
5.2	Wetlands (inland) - Seasonal/Intermittent/Irregular Rivers/Streams/Creeks
5.3	Wetlands (inland) - Shrub Dominated Wetlands
5.4	Wetlands (inland) - Bogs, Marshes, Swamps, Fens, Peatlands
5.5	Wetlands (inland) - Permanent Freshwater Lakes (over 8ha)
5.6	Wetlands (inland) - Seasonal/Intermittent Freshwater Lakes (over 8ha)
5.7	Wetlands (inland) - Permanent Freshwater Marshes/Pools (under 8ha)
5.8	Wetlands (inland) - Seasonal/Intermittent Freshwater Marshes/Pools (under 8ha)
5.9	Wetlands (inland) - Freshwater Springs and Oases
5.10	Wetlands (inland) - Tundra Wetlands (incl. pools and temporary waters from snowmelt)
5.11	Wetlands (inland) - Alpine Wetlands (includes temporary waters from snowmelt)
5.12	Wetlands (inland) - Geothermal Wetlands
5.13	Wetlands (inland) - Permanent Inland Deltas

#	Description
5.14	Wetlands (inland) - Permanent Saline, Brackish or Alkaline Lakes
5.15	Wetlands (inland) - Seasonal/Intermittent Saline, Brackish or Alkaline Lakes and Flats
5.16	Wetlands (inland) - Permanent Saline, Brackish or Alkaline Marshes/Pools
5.17	Wetlands (inland) - Seasonal/Intermittent Saline, Brackish or Alkaline Marshes/Pools
5.18	Wetlands (inland) - Karst and Other Subterranean Hydrological Systems (inland)
6	Rocky areas (eg. inland cliffs, mountain peaks)
7	Caves and Subterranean Habitats (non-aquatic)
7.1	Caves and Subterranean Habitats (non-aquatic) - Caves
7.2	Caves and Subterranean Habitats (non-aquatic) - Other Subterranean Habitats
8	Desert
8.1	Desert - Hot
8.2	Desert - Temperate
8.3	Desert - Cold
8.4	Desert - Semi-Desert (no trees present)
9	Marine Neritic
9.1	Marine Neritic - Pelagic
9.2	Marine Neritic - Subtidal Rock and Rocky Reefs
9.3	Marine Neritic - Subtidal Loose Rock/pebble/gravel
9.4	Marine Neritic - Subtidal Sandy
9.5	Marine Neritic - Subtidal Sandy-Mud
9.6	Marine Neritic - Subtidal Muddy
9.7	Marine Neritic - Macroalgal/Kelp
9.8	Marine Neritic - Coral Reef
9.8.1	Outer Reef Channel
9.8.2	Back Slope
9.8.3	Foreslope (Outer Reef Slope)
9.8.4	Lagoon
9.8.5	Inter-Reef Soft Substrate
9.8.6	Inter-Reef Rubble Substrate
9.9	Marine Neritic - Seagrass (Submerged)
9.10	Marine Neritic - Estuaries
10	Marine Oceanic
10.1	Marine Oceanic - Epipelagic (0-200m)
10.2	Marine Oceanic - Mesopelagic (200-1000m)
10.3	Marine Oceanic - Bathypelagic (1000-4000m)
10.4	Marine Oceanic - Abyssopelagic (4000-6000m)
11	Marine Deep Benthic
11.1	Marine Deep Benthic - Continental Slope/Bathyl Zone (200-4,000m)
11.1.1	Hard Substrate
11.1.2	Soft Substrate
11.2	Marine Deep Benthic - Abyssal Plain (4,000-6,000m)
11.3	Marine Deep Benthic - Abyssal Mountain/Hills (4,000-6,000m)
11.4	Marine Deep Benthic - Hadal/Deep Sea Trench (>6,000m)
11.5	Marine Deep Benthic - Seamount
11.6	Marine Deep Benthic - Deep Sea Vents (Rifts/Seeps)
12	Marine Intertidal
12.1	Marine Intertidal - Rocky Shoreline
12.2	Marine Intertidal - Sandy Shoreline and/or Beaches, Sand Bars, Spits, Etc
12.3	Marine Intertidal - Shingle and/or Pebble Shoreline and/or Beaches

#	Description
12.4	Marine Intertidal - Mud Flats and Salt Flats
12.5	Marine Intertidal - Salt Marshes (Emergent Grasses)
12.6	Marine Intertidal - Tidepools
12.7	Marine Intertidal - Mangrove Submerged Roots
13	Marine Coastal/Supratidal
13.1	Marine Coastal/Supratidal - Sea Cliffs and Rocky Offshore Islands
13.2	Marine Coastal/supratidal - Coastal Caves/Karst
13.3	Marine Coastal/Supratidal - Coastal Sand Dunes
13.4	Marine Coastal/Supratidal - Coastal Brackish/Saline Lagoons/Marine Lakes
13.5	Marine Coastal/Supratidal - Coastal Freshwater Lakes
14	Artificial/Terrestrial
14.1	Artificial/Terrestrial - Arable Land
14.2	Artificial/Terrestrial - Pastureland
14.3	Artificial/Terrestrial - Plantations
14.4	Artificial/Terrestrial - Rural Gardens
14.5	Artificial/Terrestrial - Urban Areas
14.6	Artificial/Terrestrial - Subtropical/Tropical Heavily Degraded Former Forest
15	Artificial/Aquatic & Marine
15.1	Artificial/Aquatic & Marine - Water Storage Areas (over 8ha)
15.2	Artificial/Aquatic & Marine - Ponds (below 8ha)
15.3	Artificial/Aquatic & Marine - Aquaculture Ponds
15.4	Artificial/Aquatic & Marine - Salt Exploitation Sites
15.5	Artificial/Aquatic & Marine - Excavations (open)
15.6	Artificial/Aquatic & Marine - Wastewater Treatment Areas
15.7	Artificial/Aquatic & Marine - Irrigated Land (includes irrigation channels)
15.8	Artificial/Aquatic & Marine - Seasonally Flooded Agricultural Land
15.9	Artificial/Aquatic & Marine - Canals and Drainage Channels, Ditches
15.10	Artificial/Aquatic & Marine - Karst and Other Subterranean Hydrological Systems (human-made)
15.11	Artificial/Aquatic & Marine - Marine Anthropogenic Structures
15.12	Artificial/Aquatic & Marine - Mariculture Cages
15.13	Artificial/Aquatic & Marine - Mari / Brackishculture Ponds
16	Introduced vegetation
17	Other
18	Unknown

Annex 2. IUCN-CMP Unified Classification of Direct Threats, v 1.1

Level of Classification		Definition
1	2	3 (examples only)
1. Residential & Commercial Development		
		Threats from human settlements or other non-agricultural land uses with a substantial footprint
1.1	Housing & Urban Areas <i>urban areas, suburbs, villages, vacation homes, shopping areas, offices, schools, hospitals</i>	Human cities, towns, and settlements including non-housing development typically integrated with housing
1.2	Commercial & Industrial Areas <i>military bases, factories, shopping centers, office parks, power plants, train & ship yards, airports</i>	Factories and other commercial centers
1.3	Tourism & Recreation Areas <i>ski areas, golf courses, resorts, cricket fields, county parks, afghan goat polo fields, campgrounds</i>	Tourism and recreation sites with a substantial footprint
2. Agriculture & Aquaculture		
		Threats from farming and ranching as a result of agricultural expansion and intensification, including silviculture, mariculture and aquaculture
2.1	Annual & Perennial Non-Timber Crops <i>farms, household swidden plots, plantations, orchards, vineyards, mixed agroforestry systems</i>	Crops planted for food, fodder, fiber, fuel, or other uses
2.2	Wood & Pulp Plantations <i>teak or eucalyptus plantations, loblolly pine silviculture, Christmas tree farms</i>	Stands of trees planted for timber or fiber outside of natural forests, often with non-native species
2.3	Livestock Farming & Ranching <i>cattle feed lots, chicken farms, dairy farms, cattle ranching, goat, camel, or yak herding</i>	Domestic terrestrial animals raised in one location on farmed or non-local resources (farming); also domestic or semi-domesticated animals allowed to roam in the wild and supported by natural habitats (ranching)
2.4	Marine & Freshwater Aquaculture <i>shrimp or fin fish aquaculture, fish ponds on farms, hatchery salmon, seeded shellfish beds, artificial algal beds</i>	Aquatic animals raised in one location on farmed or non-local resources; also hatchery fish allowed to roam in the wild
3. Energy Production & Mining		
		Threats from production of non-biological resources
3.1	Oil & Gas Drilling <i>oil wells, deep sea natural gas drilling</i>	Exploring for, developing, and producing petroleum and other liquid hydrocarbons
3.2	Mining & Quarrying <i>coal mines, alluvial gold panning, gold mines, rock quarries, coral mining, deep sea nodules, guano harvesting, dredging outside of shipping lanes</i>	Exploring for, developing, and producing minerals and rocks
3.3	Renewable Energy <i>geothermal power production, solar farms, wind farms (including birds and bats flying into windmills), tidal farms</i>	Exploring, developing, and producing renewable energy
4. Transportation & Service Corridors		
		Threats from long narrow transport corridors and the vehicles that use them including associated wildlife mortality
4.1	Roads & Railroads <i>highways, secondary roads, logging roads, bridges & causeways, road kill, fencing associated with roads, freight/passenger/mining railroads</i>	Surface transport on roadways and dedicated tracks
4.2	Utility & Service Lines <i>electrical & phone wires, aqueducts, oil & gas pipelines, electrocution of wildlife</i>	Transport of energy & resources
4.3	Shipping Lanes <i>dredging, canals, shipping lanes, ships running into whales, wakes from cargo ships</i>	Transport on and in freshwater and ocean waterways
4.4	Flight Paths <i>flight paths, jets impacting birds</i>	Air and space transport
5. Biological Resource Use		
		Threats from consumptive use of "wild" biological resources including both deliberate and unintentional harvesting effects; also persecution or control of specific species
5.1	Hunting & Collecting Terrestrial Animals <i>bushmeat hunting, trophy hunting, fur trapping, insect collecting, honey or bird nest hunting, predator control, pest control, persecution of snakes</i>	Killing or trapping terrestrial wild animals or animal products for commercial, recreation, subsistence, research or cultural purposes, or for control/persecution reasons; includes accidental mortality/bycatch
5.2	Gathering Terrestrial Plants <i>wild mushroom collection, forage for stall fed animals, orchid collection, rattan harvesting, control of host plants to combat timber diseases</i>	Harvesting plants, fungi, and other non-timber/non-animal products for commercial, recreation, subsistence, research or cultural purposes, or for control reasons
5.3	Logging & Wood Harvesting <i>clear cutting of hardwoods, selective commercial logging of ironwood, pulp or woodchip operations, fuel wood collection, charcoal production</i>	Harvesting trees and other woody vegetation for timber, fiber, or fuel
5.4	Fishing & Harvesting Aquatic Resources <i>trawling, blast fishing, spear fishing, shellfish harvesting, whaling, seal hunting, turtle egg collection, live coral collection, seaweed collection</i>	Harvesting aquatic wild animals or plants for commercial, recreation, subsistence, research, or cultural purposes, or for control/persecution reasons; includes accidental mortality/bycatch
6. Human Intrusions & Disturbance		
		Threats from human activities that alter, destroy and disturb habitats and species associated with non-consumptive uses of biological resources
6.1	Recreational Activities <i>off-road vehicles, motorboats, jet-skis, snowmobiles, ultralight planes, dive boats, whale watching, mountain bikers, hikers, skiers, birdwatchers, scuba divers, pets in rec areas, campsites, caving, rock-climbing</i>	People spending time in nature or traveling in vehicles outside of established transport corridors, usually for recreational reasons
6.2	War, Civil Unrest & Military Exercises <i>armed conflict, mine fields, tanks & other military vehicles, training exercises & ranges, defoliation, munitions testing</i>	Actions by formal or paramilitary forces without a permanent footprint
6.3	Work & Other Activities <i>law enforcement, drug smugglers, illegal immigrants, species research, vandalism</i>	People spending time in or traveling in natural environments for reasons other than recreation or military activities

Level of Classification 1 2 3 (examples only)	Definition
7. Natural System Modifications 7.1 Fire & Fire Suppression <i>fire suppression to protect homes, inappropriate fire management, escaped agricultural fires, arson, campfires, fires for hunting</i> 7.2 Dams & Water Management/Use <i>dam construction, dam operations, sediment control, change in salt regime, wetland filling for mosquito control, levees/dikes, surface water diversion, groundwater pumping, channelization, artificial lakes</i> 7.3 Other Ecosystem Modifications <i>land reclamation projects, abandonment of managed lands, rip-rap along shoreline, mowing grass, tree thinning, beach construction, removal of snags from streams, physical pest & weed control efforts</i>	Threats from actions that convert or degrade habitat in service of “managing” natural or semi-natural systems, often to improve human welfare Suppression or increase in fire frequency and/or intensity outside of its natural range of variation Changing water flow patterns from their natural range of variation either deliberately or as a result of other activities Other actions that convert or degrade habitat in service of “managing” natural systems to improve human welfare
8. Invasive & Other Problematic Species & Genes 8.1 Invasive Non-Native/Alien Species <i>feral cattle, household pets, zebra mussels, Dutch elm disease or chestnut blight, Miconia tree, introduction of species for biocontrol, chytrid fungus affecting amphibians outside of Africa</i> 8.2 Problematic Native Species <i>overabundant native deer, overabundant algae due to loss of native grazing fish, native plants that hybridize with other plants, plague affecting rodents</i> 8.3 Introduced Genetic Material <i>pesticide resistant crops, hatchery salmon, restoration projects using non-local seed stock, genetically modified insects for biocontrol, genetically modified trees, genetically modified salmon</i>	Threats from non-native and native plants, animals, pathogens/microbes, or genetic materials that have or are predicted to have harmful effects on biodiversity following their introduction, spread and/or increase in abundance Harmful plants, animals, pathogens and other microbes not originally found within the ecosystem(s) in question and directly or indirectly introduced and spread into it by human activities Harmful plants, animals, or pathogens and other microbes that are originally found within the ecosystem(s) in question, but have become “out-of-balance” or “released” directly or indirectly due to human activities Human altered or transported organisms or genes
9. Pollution 9.1 Household Sewage & Urban Waste Water <i>Discharge from municipal waste treatment plants, leaking septic systems, untreated sewage, outhouses, oil or sediment from roads, fertilizers and pesticides from lawns and golf-courses, road salt</i> 9.2 Industrial & Military Effluents <i>toxic chemicals from factories, illegal dumping of chemicals, mine tailings, arsenic from gold mining, leakage from fuel tanks, PCBs in river sediments</i> 9.3 Agricultural & Forestry Effluents <i>nutrients from fertilizer run-off, herbicide & chemical pest-control, manure from feedlots, nutrients from aquaculture, soil erosion</i> 9.4 Garbage & Solid Waste <i>municipal waste, litter from cars, flotsam & jetsam from recreational boats, waste that entangles wildlife, construction debris</i> 9.5 Air-Borne Pollutants <i>acid rain, smog from vehicle emissions, excess nitrogen deposition, airborne mercury, radioactive fallout, wind dispersion of pollutants or sediments, smoke from forest fires or wood stoves</i> 9.6 Excess Energy <i>noise from highways or airplanes, sonar from submarines that disturbs whales, heated water from power plants, lamps attracting insects, beach lights disorienting turtles, atmospheric radiation from ozone holes</i>	Threats from introduction of exotic and/or excess materials or energy from point and nonpoint sources Water-borne sewage and non-point runoff from housing and urban areas that include nutrients, toxic chemicals and/or sediments Water-borne pollutants from industrial and military sources including mining, energy production, and other resource extraction industries that include nutrients, toxic chemicals and/or sediments Water-borne pollutants from agricultural, silvicultural, and aquaculture systems that include nutrients, toxic chemicals and/or sediments including the effects of these pollutants on the site where they are applied Rubbish and other solid materials including those that entangle wildlife Atmospheric pollutants from point and nonpoint sources Inputs of heat, sound, or light that disturb wildlife or ecosystems
10. Geological Events 10.1 Volcanoes <i>eruptions, emissions of volcanic gasses</i> 10.2 Earthquakes/Tsunamis <i>earthquakes, tsunamis</i> 10.3 Avalanches/Landslides <i>avalanches, landslides, mudslides</i>	Threats from catastrophic geological events Volcanic events Earthquakes and associated events Avalanches or landslides
11. Climate Change & Severe Weather 11.1 Habitat Shifting & Alteration <i>sea-level rise, desertification, tundra thawing, coral bleaching, changes in elevetational gradients</i> 11.2 Droughts <i>severe lack of rain, loss of surface water sources</i> 11.3 Temperature Extremes <i>heat waves, cold spells, oceanic temperature changes, disappearance of glaciers/sea ice</i> 11.4 Storms & Flooding <i>thunderstorms, tropical storms, hurricanes, cyclones, tornados, hailstorms, ice storms or blizzards, dust storms, erosion of beaches during storms</i>	Threats from long-term climatic changes which may be linked to global warming and other severe climatic/weather events that are outside of the natural range of variation, or potentially can wipe out a vulnerable species or habitat Major changes in habitat composition and location Periods in which rainfall falls below the normal range of variation Periods in which temperatures exceed or go below the normal range of variation Extreme precipitation and/or wind events

Annex 3. IUCN-CMP Unified Classification of Conservation Actions, v 1.1

Level of Classification			Definition
1	2	3 (examples only)	
1. Land/Water Protection			Actions to identify, establish or expand parks and other legally protected areas
	1.1 Site/Area Protection	<i>national parks, town wildlife sanctuaries, private reserves, tribally owned hunting grounds</i>	Establishing or expanding public or private parks, reserves, and other protected areas roughly equivalent to IUCN Categories I-VI
	1.2 Resource & Habitat Protection	<i>easements, development rights, water rights, instream flow rights, wild & scenic river designation</i>	Establishing protection or easements of some specific aspect of the resource on public or private lands outside of IUCN Categories I-VI
2. Land/Water Management			Actions directed at conserving or restoring sites, habitats and the wider environment
	2.1 Site/Area Management	<i>site design, demarcating borders, putting up fences, training park staff, control of poachers</i>	Management of protected areas and other resource lands for conservation
	2.2 Invasive/Problematic Species Control	<i>cutting vines off trees, preventing ballast water discharge</i>	Controlling and/or preventing invasive and/or other problematic plants, animals, and pathogens
	2.3 Habitat & Natural Process Restoration	<i>creating forest corridors, prairie re-creation, riparian tree plantings, coral reef restoration, proscribed burns, breaching levees, dam removal, fish ladders, liming acid lakes, cleaning up oil spills</i>	Enhancing degraded or restoring missing habitats and ecosystem functions; dealing with pollution
3. Species Management			Actions directed at managing or restoring species, focused on the species of concern itself
	3.1 Species Management	<i>harvest management of wild mushrooms, culling buffalo to keep population size within park carrying capacity, controlling fishing effort</i>	Managing specific plant and animal populations of concern
	3.2 Species Recovery	<i>manual pollination of trees, artificial nesting boxes, clutch manipulation, supplementary feeding, disease/pathogen/parasite management</i>	Manipulating, enhancing or restoring specific plant and animal populations, vaccination programs
	3.3 Species Re-Introduction	<i>re-introduction of wolves</i>	Re-introducing species to places where they formally occurred or benign introductions
	3.4 Ex-situ Conservation	<i>captive breeding of gorillas, artificial propagation of orchids, gene-banking</i>	Protecting biodiversity out of its native habitats
4. Education & Awareness			Actions directed at people to improve understanding and skills, and influence behavior
	4.1 Formal Education	<i>public schools, colleges & universities, continuing education</i>	Enhancing knowledge and skills of students in a formal degree program
	4.2 Training	<i>monitoring workshops or training courses in reserve design for park managers, learning networks or writing how-to manuals for project managers, stakeholder education on specific issues</i>	Enhancing knowledge, skills and information exchange for practitioners, stakeholders, and other relevant individuals in structured settings outside of degree programs
	4.3 Awareness & Communications	<i>radio soap operas, environmental publishing, web blogs, puppet shows, door-to-door canvassing, tree sitting, protest marches</i>	Raising environmental awareness and providing information through various media or through civil disobedience
5. Law & Policy			Actions to develop, change, influence, and help implement formal legislation, regulations, and voluntary standards
	5.1 Legislation	<i>Global: promoting conventions on biodiversity, wildlife trade laws like CITES National: work for or against government laws such as the US Endangered Species Act, influencing legislative appropriations State/Provincial: state ballot initiatives, provi</i>	Making, implementing, changing, influencing, or providing input into formal government sector legislation or policies at all levels: international, national, state/provincial, local, tribal
	5.2 Policies & Regulations	<i>Input into agency plans regulating certain species or resources, working with local governments or communities to implement zoning regulations; promoting sustainable harvest of timber on state forest lands</i>	Making, implementing, changing, influencing, or providing input into policies and regulations affecting the implementation of laws at all levels: international, national, state/provincial, local/community, tribal
	5.3 Private Sector Standards & Codes	<i>Marine & Forest Stewardship Councils, Conservation Measures Partnership (CMP) Open Standards, corporate adoption of forestry best management practices, sustainable grazing by a rancher</i>	Setting, implementing, changing, influencing, or providing input into voluntary standards & professional codes that govern private sector practice
	5.4 Compliance & Enforcement	<i>Water quality standard monitoring, initiating criminal and civil litigation</i>	Monitoring and enforcing compliance with laws, policies & regulations, and standards & codes at all levels

Level of Classification			Definition
1	2	3 (examples only)	
6. Livelihood, Economic & Other Incentives			Actions to use economic and other incentives to influence behavior
	6.1 Linked Enterprises & Livelihood Alternatives	<i>ecotourism, non-timber forest product harvesting, harvesting wild salmon to create value for wild population</i>	Developing enterprises that directly depend on the maintenance of natural resources or provide substitute livelihoods as a means of changing behaviors and attitudes
	6.2 Substitution	<i>Viagra for rhino horn, farmed fish as a replacement for pressure on wild populations, promoting recycling and use of recycled materials</i>	Promoting alternative products and services that substitute for environmentally damaging ones
	6.3 Market Forces	<i>certification, positive incentives, boycotts, negative incentives, grass & forest banking, valuation of ecosystem services such as flood control</i>	Using market mechanisms to change behaviors and attitudes
	6.4 Conservation Payments	<i>quid-pro-quo performance payments, resource tenure incentives</i>	Using direct or indirect payments to change behaviors and attitudes
	6.5 Non-Monetary Values	<i>spiritual, cultural, links to human health</i>	Using intangible values to change behaviors and attitudes
7. External Capacity Building			Actions to build the infrastructure to do better conservation
	7.1 Institutional & Civil Society Development	<i>creating new local land trusts, providing circuit riders to help develop organizational capacity</i>	Creating or providing non-financial support & capacity building for non-profits, government agencies, communities, and for-profits
	7.2 Alliance & Partnership Development	<i>country networks, Conservation Measures Partnership (CMP)</i>	Forming and facilitating partnerships, alliances, and networks of organizations
	7.3 Conservation Finance	<i>private foundations, debt-for-nature swaps</i>	Raising and providing funds for conservation work