

Anticipating Success

What Happens After You Remove that
Invasive from Your Ecosystem Landscape:
*understanding and planning
for what comes next*

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Invasive Species are Everywhere



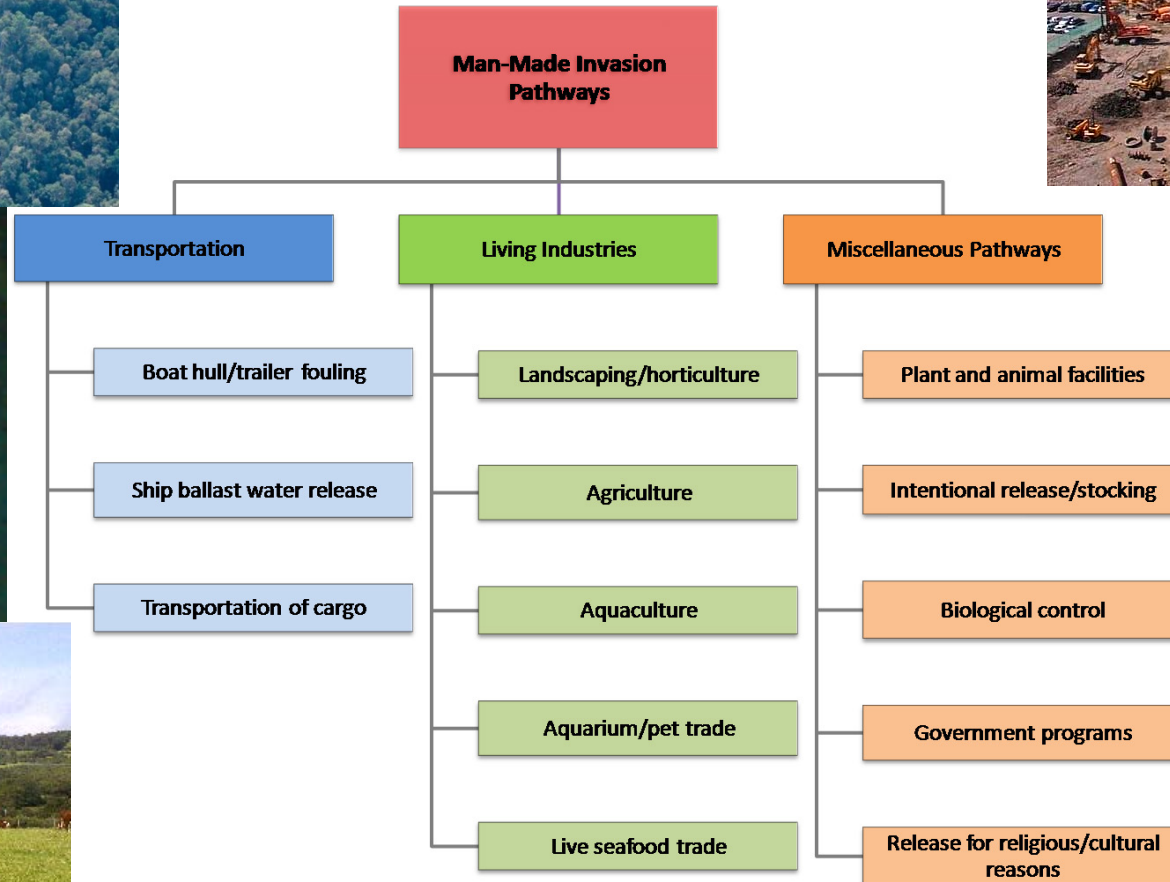
Huge Efforts to Remove Massive Infestations



Why Do We Care?

Executive Order 13112 – defines an *invasive species* as “an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.” In the Executive Summary of the National Invasive Species Management Plan (NMP) the term *invasive species* is further clarified and defined as “a species that is non-native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health.”

Pathways & Disturbance = Recipe for Establishment



Unintended Consequences of Doing the Right Thing without a Plan



Felis silvestris catus



Cook's Petrel *Pterodroma cookii*



Rattus exulans

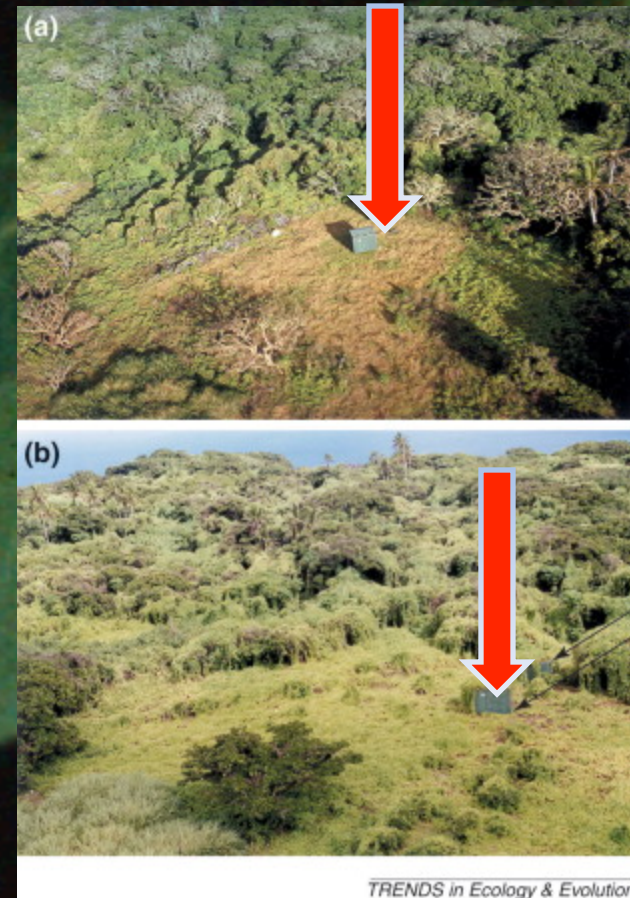
Before and After

Back to the Beginning without a Plan

An adverse effect of eradication. The photographs show a camp site on Sarigan Island, Commonwealth of the Northern Mariana Islands, before (a) and after (b) successful eradication of feral goats *Capra hircus* and pigs *Sus scrofa* in 1998 explosively released a previously undetected exotic vine *Operculina ventricosa*.

Arrows in (b) indicate the locations of the two buildings visible in (a).

Reproduced, from Curt Kessler, Zoology Unlimited. <http://www.sciencedirect.com/science/article/pii/S0169534701021942>



The Plan

Think Like a Gardener



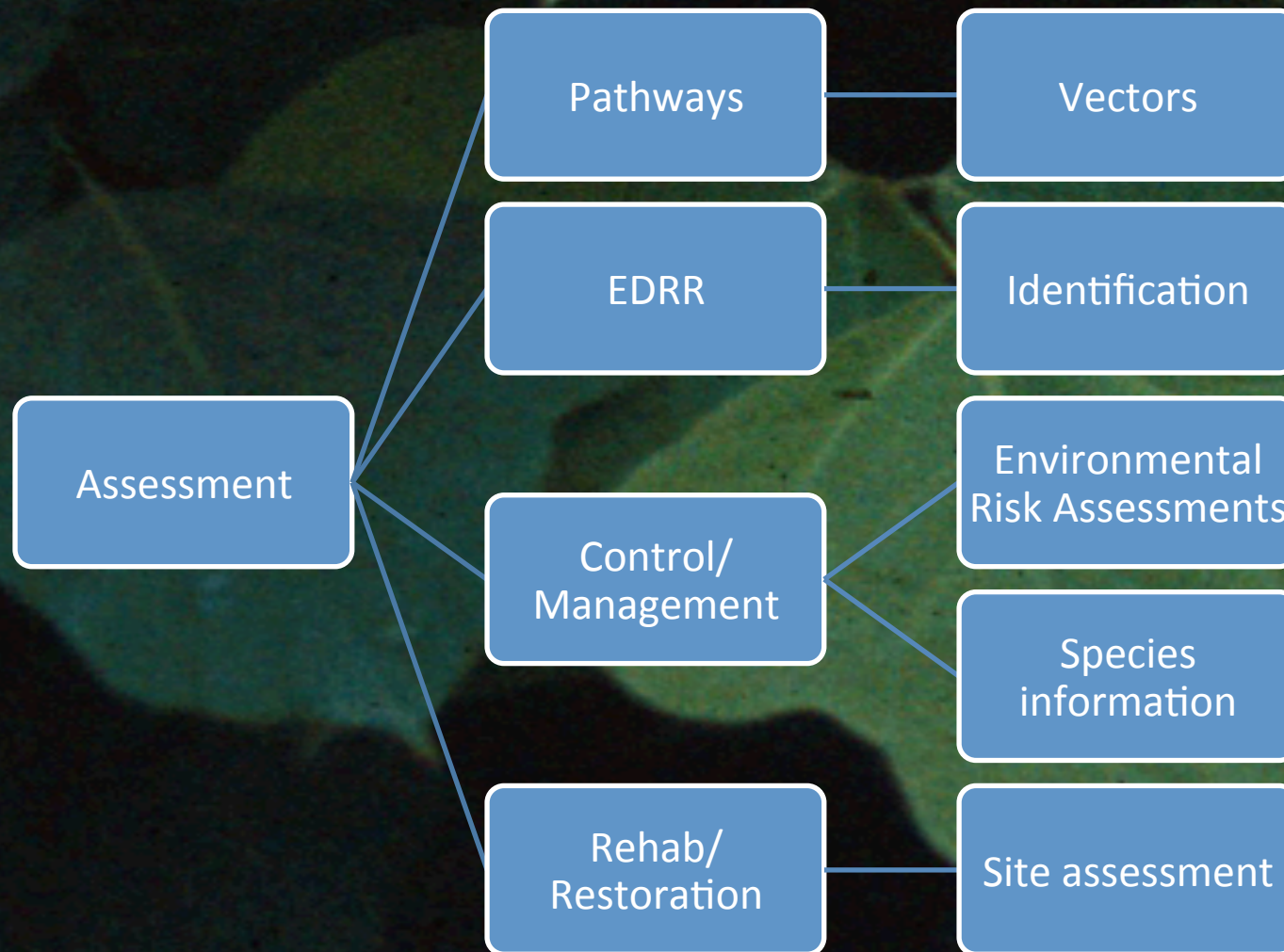
The Basic Questions

- What are you (the team) doing?
- Are you in compliance with government regulations, guidelines, codes of practice, permits conditions , certifications, IPM strategies and BMPs?
- Can you do it better?
- Are there non regulated areas where operations can be improved to minimize the impact on the environment ?
- Can you do it at less cost?
- What more should you do ?

Basics of a Comprehensive Invasive Species Management Plan

- Prevention
- Early detection and rapid response
- Control and management
- Rehabilitation and restoration

Assessments are the Key



Environmental Assessment

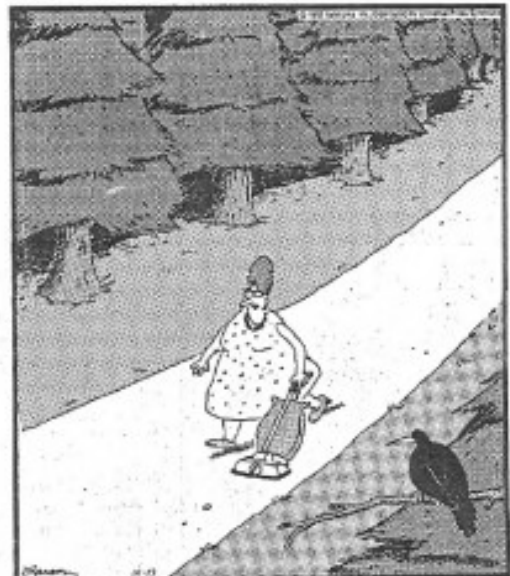
No Action

Mechanical/Cultural (abiotic)

Chemical

Biological (biotic)

THE FAR SIDE • Gary Larson



The woods were dark and foreboding, and Alice sensed that sinister eyes were watching her every step. Worst of all, she knew that Nature abhorred a vacuum.

Environmental Assessment

Description of the project

- Description of actual project and site description
- Breakdown of the project into its key components, i.e. construction, operations. inputs
- For each component list all of the sources of environmental disturbance
- For each component all the inputs and outputs must be listed

Environmental Assessment

Description of the environment

- List of all aspects of the environment that may be affected by the invasive species project; example: populations, fauna, flora, air, soil, water, humans, landscape, cultural heritage

Consider alternatives

- Examine alternatives to each removal strategy

Environmental Assessment

Description of the significant effects on the environment of the invasive species removal strategies

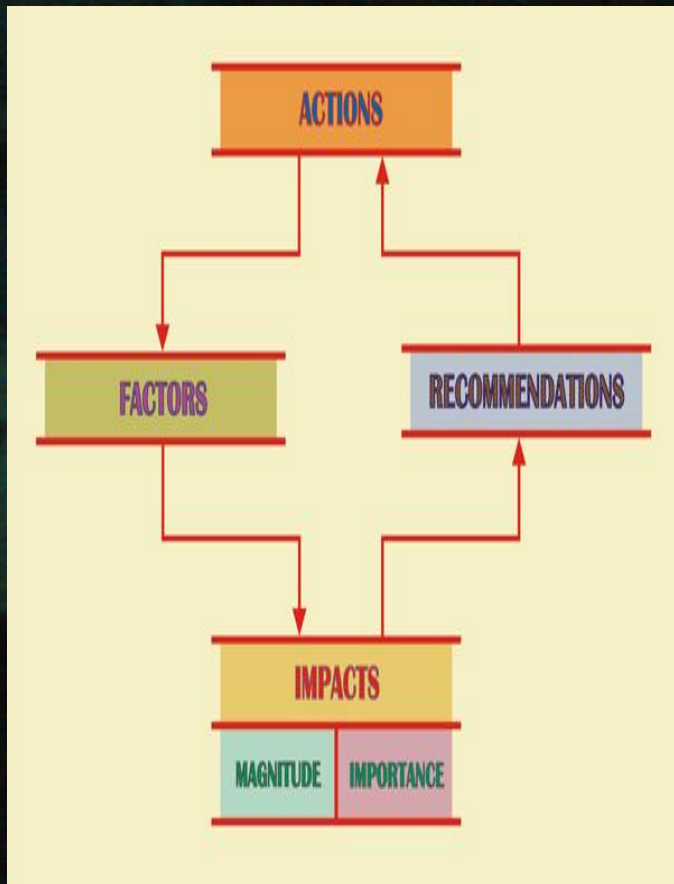
The word significant is crucial here as the definition can vary 'Significant' needs to be defined

The Leopold matrix:

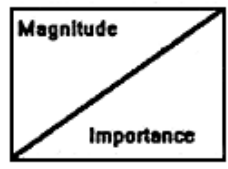
The system consists of a matrix with columns representing the various activities of the project, and rows representing the various environmental factors to be considered. The intersections are filled in to indicate the magnitude (from -10 to +10) and the importance (from 1 to 10) of the impact of each activity on each environmental factor.

Leopold Matrix

The "magnitude" of the impact upon specific sector(s) of the environment. The term "magnitude" is used here in the sense of degree, extensiveness, or scale. The second is the "importance," i.e., the significance of the proposed actions on the specific environmental characteristics and conditions. Unlike magnitude of impact, which can be readily evaluated on the basis of facts, the importance of impact is generally based on a value judgment [of the evaluator].



Matrix Example



Evaluation method

			NO ACTION	ABIOTIC	CHEMICAL	BIOLOGICAL
ECOSYSTEM SERVICES	REGULATING	STORM WATER				
		EROSION				
		CO2				
	PROVIDING	REFUGIA				
		POLLINATORS				
		BIODIVERSITY				
	PROVISIONING	FARMING				
		MINING				
		FORESTRY				
		FISHING				
	INFORMING	RECREATION				
		HEALTH				
		HISOTRY				
		SPIRITUAL				

The Batelle method

The principle lies in splitting the environmental impacts in four major categories: ecology, pollution, aesthetics and human interest. These categories are divided into thematic data as shown :

Ecology

Species and populations,
Habitats and communities,
Ecosystems.

Pollution

Water pollution,
Air pollution,
Land pollution,
Noise pollution.

Aesthetics

Land,
Air,
Water,
Biota,
Man made objects,
Composition.

Human interest

Educational/scientific packages,
Historical packages,
Cultures,
Mood/atmosphere,

data are divided into environmental indicators
data are divided into environmental indicators.
Strategies and tactics can be quantitatively compared

Environmental Assessment

- Invasive Plants Change Expected Pathways of Plant Succession
- Integrating Restoration and Succession
- Need for Post-removal Re-vegetation Planning

Overview of CFLR Multiparty Monitoring Process

Hold Multiparty Meeting - Identify common goals and monitoring concerns for the project. Construct communications framework outlining information transfer between project stakeholders.

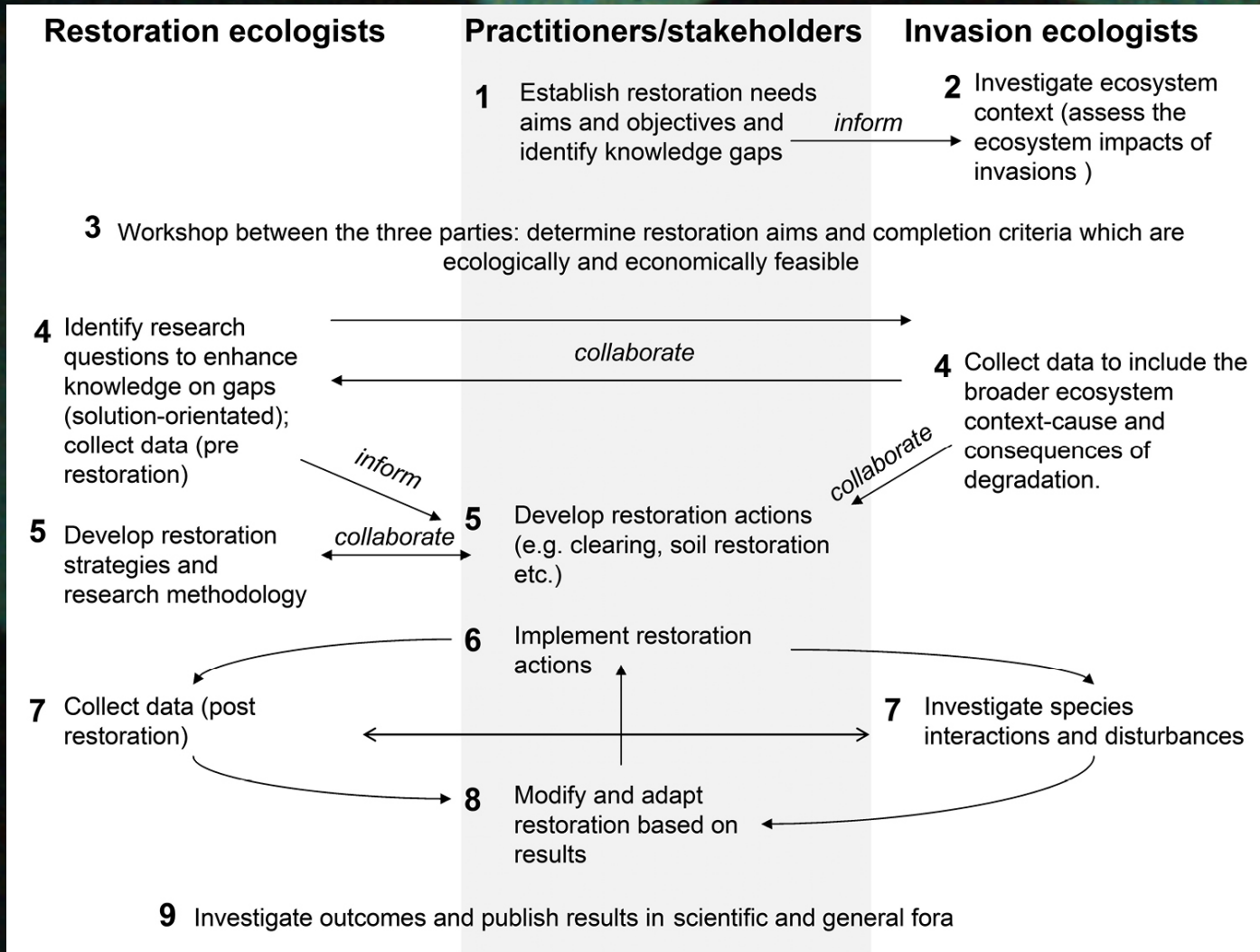
Develop Monitoring Plan - Describe indicators to measure change built on reliable data collection methods. Specifically address where, when, and who will gather project data.

Gather Data - Collect pre-treatment measures, repeated measures, to determine post-treatment success. Ensure data is kept in a long-term safe place.

Analyze Results - Conduct reliable and simple calculations on data from local, regional, and national perspectives. Schedule multiparty team meetings to discuss and interpret results.

Share Results - Keep process transparent, adaptive, and flexible. Suggest tangible prescriptions when new information becomes available. Report results illustrating both success and failure.

How It All Comes Together



How can we help?

- ✓ **Project management**
 - **planning, removal, restoration**
- ✓ **Individual Species Assessments**
- ✓ **Facilitation, coordination & review**
 - **Program details**
 - **Stakeholder outreach**
- ✓ **Environmental Impact Assessments**
- ✓ **Policy & Advocacy Reports**

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**Ecosystem Surgeon-general's Warning:
*This species may be harmful to your
environment***