Blueprints for a Greener Footprint: Achieving Sustainable Development at a Landscape Scale

Bruce McKenney
Director, Development by Design
The Nature Conservancy

Nicholas Institute
November 6, 2015
INTRODUCTION TO THE NATURE CONSERVANCY

GLOBAL REACH & SCALE
LARGEST CONSERVATION NOT-FOR-PROFIT IN THE WORLD

PLACE-BASED EXPERIENCE
AT WORK IN THE US AND IN MORE THAN 35 COUNTRIES

SCIENCE-BASED KNOW-HOW
HOME TO MORE THAN 600 SCIENTISTS

NETWORK OF RELATIONSHIPS
POWERED BY 1,350 TRUSTEES AND 1 MILLION MEMBERS
Presentation overview

- Global challenge
- Transforming development planning: Development by Design
- Case 1: Sustainable development in Mongolia
- Case 2: Accelerating renewable energy in the US
- Case 3: Mitigating cumulative impacts to biodiversity and ecosystem services in the US
- Key needs going forward
Solomons' gold mine set to reshape South Pacific nation

Fri, Apr 29 2011

By James Regan

HONIARA, Solomon Islands (Reuters) - Elijah David trudged the 55 km in plastic sandals from his home in Guadalcanal province to the only gold mine in Solomon Islands, hoping to find work that may transform his life and that of his South Pacific Island nation, for better or perhaps worse.

It had taken a decade to rebuild the mine after warring tribespeople from another province, bent on maintaining an agrarian society in Solomon Islands, chased workers away with machetes and destroyed just about everything in their path.

Massive Copper Mine in the Heart of Lower Zambezi National Park Approved

Posted by Paul Steyn on January 23, 2014

“'To those devoid of imagination a blank place on the map is a useless waste; to others, the most valuable part.’
— Aldo Leopold, A Sand County Almanac

If you look on a map of Zambia, about 100km to the east of Lusaka, you’ll see a massive green nondescript block of nothing on the Zambezi River.

This patch of 4000-square-kilometres is the Lower Zambezi National Park.
Development by Design
Development by Design
The Problem
Bandages instead of blueprints

Mining Tenements in the Great Western Woodlands (Australia)

The Nature Conservancy
Protecting nature. Preserving life.
Global Challenge

Population to reach 9 billion by 2050
(United Nations 2012)

Food crop demand up >100% in 2050
(Tilman et al. 2012)

Global economic growth to double by 2030
(World Bank 2013)

Global energy demand to rise 35% by 2040
(Exxon, Outlook for Energy 2013)

Global mineral demand to rise 60% by 2050
(Kesler 2007)
Future footprint: Cumulative development threat

Global Assessment: Lands at Risk

DEVELOPMENT THREAT CATEGORIES

NATURAL LANDS

20% OF LANDS AT HIGH RISK

5% OF LANDS PROTECTED

INCREASING CONFLICT

Figure 1: Incidents of company–community conflict (2002–2013)

Source: ICMM 2015
Presentation overview

- Global challenge
- **Transforming development planning: Development by Design**
- Case 1: Sustainable development in Mongolia
- Case 2: Accelerating renewable energy in the US
- Case 3: Mitigating cumulative impacts to biodiversity and ecosystem services in the US
- Key needs going forward
Oil and Gas Drilling Plans Must Accommodate Grouse to Avoid ESA Listing -- Study

By Scott Streater, Special To E&E of Greenwire
Published: October 22, 2009

PENDLEY: Killing jobs to save the sage grouse
Junk science, weird science and plain nonsense

Fewer Cattle Allowed On Idaho Sage Grouse Habitat
Jan. 29, 2013 | AP

Endangered listings for sage grouse would impact Utah
Traditional development approach: Cumulative impacts
ABCs of landscape-level planning benefits

**Advance planning:**
Planning at a landscape scale before initial project investments supports proactive and comprehensive risk assessment for projects.

**Bigger scale:**
Planning for development at a larger scale moves beyond a project-by-project approach, making clear the potential cumulative impacts for a region.

**Comprehensive:**
Developing landscape-scale strategies supports avoiding impacts to high-value areas and incentivizing development in low-conflict areas.
Before Project Corridor — Duplicate infrastructure

Follow the Mitigation Hierarchy

Potential Impact

Avoid

Residual Impact

Minimize

Restore

Offset

No Net Loss


Development by Design Framework

1. Setting Priorities
   Conservation, ecosystem services, other values

2. Projecting Impacts
   Cumulative impacts, early warning, avoidance, opportunities for sustainable outcomes

3. Identifying Best Options
   For impacts that do occur, opportunities for mitigation strategies and offsets

4. Measuring Progress
   Extent to which mitigation actions support conservation goals
Select BIODIVERSITY ELEMENTS

COARSE FILTER
Vegetation Types

FINE FILTER
Species

Other Goals i.e. Eco. Services
Social/Cultural

Set GOALS

(X) Acres of habitat needed to maintain viability

(Y) Acres of habitat or point locations (i.e. nests) needed to maintain viability

assess ECOLOGICAL CONDITION

Cost / Suitability Index
- Road & RR Density
- Population Density
- Converted Land Cover
- Irrigated Land Cover
- Housing density

Conservation Portfolio Design:
Development Portfolio Design: automated site selection (MARXAN with ZONES)

Future development pressure

(Z) Amount of production
10 countries

- Argentina
- Australia
- Colombia
- Gabon
- Kenya
- Mongolia
- Peru
- Solomon Islands
- United States
- Zambia
Development by Design Publications:


Copeland, HE, A Pocewicz, and J Kiesecker (In Press) Geography of energy development in Western North America: Potential impacts to terrestrial ecosystems. Chapter in: Energy development and wildlife conservation in Western North America (Edited by DE Naugle)


### US policy: “The next generation of mitigation”

<table>
<thead>
<tr>
<th>White House</th>
<th>DOI</th>
<th>FWS</th>
<th>BLM</th>
<th>USFS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Executive Order 13604 (March 2012)</td>
<td>• Secretarial Order on Mitigation (Oct 2013)</td>
<td>• Update to 1981 Mitigation Policy</td>
<td>• Regional Mitigation Policy (draft 2013, final late-2015)</td>
<td>• USFS Chief Letter: National Landscape-Scale Mitigation Framework</td>
</tr>
<tr>
<td></td>
<td>• Departmental Manual: Implementing Mitigation at a Landscape Scale (Nov 2015)</td>
<td>• Policy on Mitigation for Candidate Species</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Global Momentum

- **56 countries** have or are developing national mitigation policies requiring or enabling biodiversity offsets (TBC 2013).
- **Lending performance standards** for multi-lateral institutions and 80 private financial institutions require projects they finance to avoid, minimize, and compensate for biodiversity impacts for net gain or no net loss (IFC 2012, EBRD 2014, EPFI 2013).
- At least **32 companies** have established no net loss or net positive impact goals for biodiversity to guide their corporate practices (Rainey *et al.* 2014).
Presentation overview

• Global challenge
• Transforming development planning: Development by Design
  • Case 1: Sustainable development in Mongolia
  • Case 2: Accelerating renewable energy in the US
  • Case 3: Mitigating cumulative impacts to biodiversity and ecosystem services in the US
• Key needs going forward
Age old Mongolian nomadic heritage under threat due to mining

Friday, November 30th, 2012

Booming Mongolia

Mine, all mine

The country that is likely to grow faster than any other in the next decade, and how it is changing, for better or worse

Mongolia Gold Rush Destroying Rivers, Nomadic Lives
National Geographic News
October 17, 2008

Mineral-Rich Mongolia Rapidly Becoming 'Mine-golia'
by FRANK LANGFITT
May 21, 2012  2:59 AM
Mongolia: Mineral Conservation Blueprint

The Nature Conservancy
Protecting nature. Preserving life.

Map of Mongolia showing mineral leases and other land uses. The map includes color-coded areas representing different types of mineral leases: active mines, application, exploration, and tender bid. Major lakes and Aimag borders are also indicated. The Oyu Tolgoi mine site is marked with a specific symbol.
Benefits of Landscape-Scale Planning

- Identifies conservation priorities in the context of future development scenarios
- Provides early warning of possible development-conservation conflicts and risks
- Incorporates traditional use & social/cultural values
- Supports compliance with national policies and lending standards (IFC Performance Standard 6)
- Provides a vision for sustainable development; offsets finance conservation goals
Regional offset scenario – one mine

This map shows the approximate footprint of the one mine site, and a set of ecologically similar sites within the conservation portfolio. This demonstrates how a landscape-level conservation plan and supporting information can be used to identify offset sites, as discussed in Section 2.10. This analysis is not intended to estimate ratios or area necessary to meet offset accounting objectives of no-net-loss or net-positive-impact.

**Offset analysis**
- **approximate footprint of one mine site** (mine site + infrastructure)
- Ecologically similar sites within conservation portfolio

National PAs
- Conservation portfolio sites
New Protected Areas
Empowered Communities

A map of mining cadastre department showing mining leases and proposed PA

This is a local man’s hand drawn PA map based on our ERA results

Proposed PA map came out of the TNC Gobi ERA: 336,000 acres
• Global Challenge
• Transforming development planning: Development by Design
• Case 1: Sustainable development in Mongolia
• Case 2: Accelerating renewable energy in the US
• Case 3: Mitigating cumulative impacts to biodiversity and ecosystem services in the US
• Key needs going forward
Mojave Desert Conservation Value

Project Area
- Mojave Desert

Conservation Value
- **Ecologically Core**
  Land with low levels of anthropogenic disturbance which support conservation targets and whose protection is critical for the long-term conservation of the ecoregion’s biological diversity
- **Ecologically Intact**
  Land with low levels of anthropogenic disturbance or which supports conservation targets and which requires a level of protection that will enable it to continue to support ecological processes and provide connectivity
- **Moderately Degraded**
  Land fragmented by roads, off-road-vehicle trails or in close proximity to urban, agricultural and other developments
- **Highly Converted**
  Land in urban and agricultural areas that is fragmented and most impacted by human uses

Boundaries
- State
- County

Transportation
- Major Road
- Other Road

Hydrology
- Major River

Produced by The Nature Conservancy California South Coast & Deserts Program
Map Date: July 1, 2010
See Table A.1 for sources
Development by Design: Mitigating Wind Development's Impacts on Wildlife in Kansas

Brian Obermeyer¹, Robert Manes², Joseph Kiesecker³, Joseph Fargione⁴*, Kei Sochi⁵

¹ The Nature Conservancy, Cottonwood Falls, Kansas, United States of America, ² The Nature Conservancy, Topeka, Kansas, United States of America, ³ The Nature Conservancy, Fort Collins, Colorado, United States of America, ⁴ The Nature Conservancy, Minneapolis, Minnesota, United States of America, ⁵ The Nature Conservancy, Boulder, Colorado, United States of America
Development by Design for Wind

AVOID

OFFSET

No Mitigation
Mitigation Costs

Based on actual costs of restoring and protecting

Prairie chicken

Grassland

Playa lakes
• Global Challenge
• Transforming development planning: Development by Design
• Case 1: Sustainable development in Mongolia
• Case 2: Accelerating renewable energy in the US
• Case 3: Mitigating cumulative impacts to biodiversity and ecosystem services in the US
• Key needs going forward
Shale Gas, Wind and Water: Assessing the Potential Cumulative Impacts of Energy Development on Ecosystem Services within the Marcellus Play

Jeffrey S. Evans\textsuperscript{1,2*}, Joseph M. Kiesecker\textsuperscript{3}

\textsuperscript{1} The Nature Conservancy, Fort Collins, Colorado, United States of America, \textsuperscript{2} Department of Zoology and Physiology, University of Wyoming, Laramie, Wyoming, United States of America, \textsuperscript{3} The Nature Conservancy, Fort Collins, Colorado, United States of America
2003 code-six watersheds

~20 million people rely on headwater watersheds for drinking water supply

70% forested headwaters

High gas pressurization area with intersecting watersheds

42,963,005 acres
Area under receiver operator characteristic curve (AUC) = 0.96

Marcellus gas play well development probabilities

Red = high probability
Blue = Low probability
Photographs of a) example gas development footprint in hectares, and b) example wind farm footprint in hectares. Inset table represents associated impacts used in the analysis. Estimates of potential surface disturbance associated with gas wells and wind turbines were based on measurements taken from aerial photographs from Johnson (2010) and Johnson et al. (2011).
18% (n=360) of “sensitive” watersheds will transition into a higher impact status.

7% (n=130) will move into a “nonsupporting” or “urban” drainage impact status.

1,490,732 acres of impervious surfaces and upwards of 1,224,053 acres of affected forest.
Assessing Future Energy Development in the Appalachians
• Global Challenge
• Transforming development planning: Development by Design
• Case 1: Sustainable development in Mongolia
• Case 2: Accelerating renewable energy in the US
• Case 3: Mitigating cumulative impacts to biodiversity and ecosystem services in the US
• Key needs going forward
Key needs

- Integrating ecosystem services
  - Beyond ES production to human benefits
  - Community-defined social and cultural values
  - Land-based climate solutions: reducing emissions and increasing sequestration
- Practical/defensible compensatory mitigation approaches (e.g., crediting methods for US and other countries)
- Economic benefits of restoration
- Support for new approaches to endangered species management (e.g., Sage Grouse)
- Others?