

Research Seminars

**System Analyses for Sustainable Agricultural Production and Livelihoods of Smallholders:
Complementary Approaches and Case studies in Southwestern Burkina Faso**

14 and 16 February 2017, ICARDA Office, Amman, Jordan

System Sustainability Orientors for Developing SI Indicators in Coping with Complexity Context

Quang Bao Le (DS, SIRPSP/ICARDA)



RESEARCH
PROGRAM ON
Dryland Systems



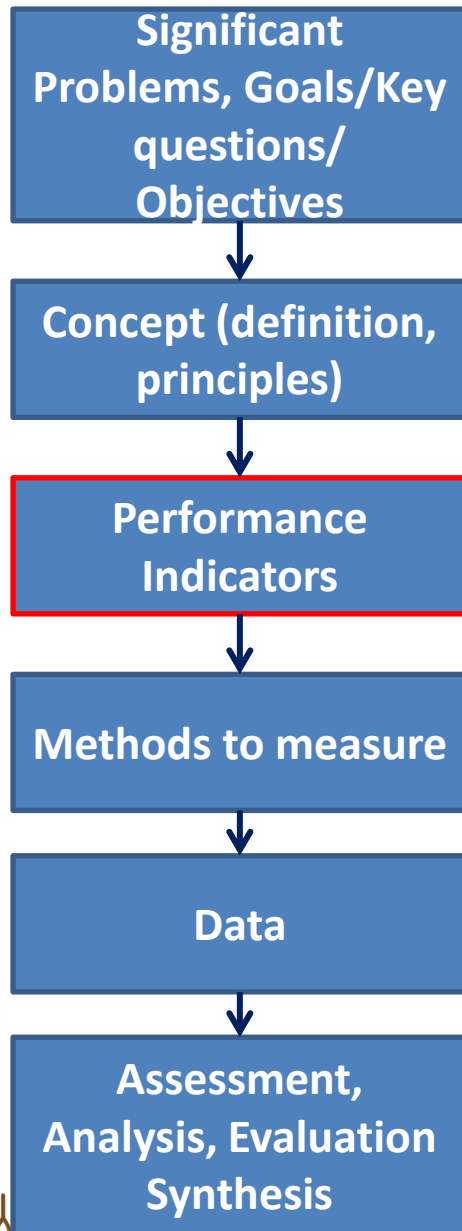
ICARDA
Science for Better Livelihoods in Dry Areas

ETH

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich



Why are Indicators of SI Matters?



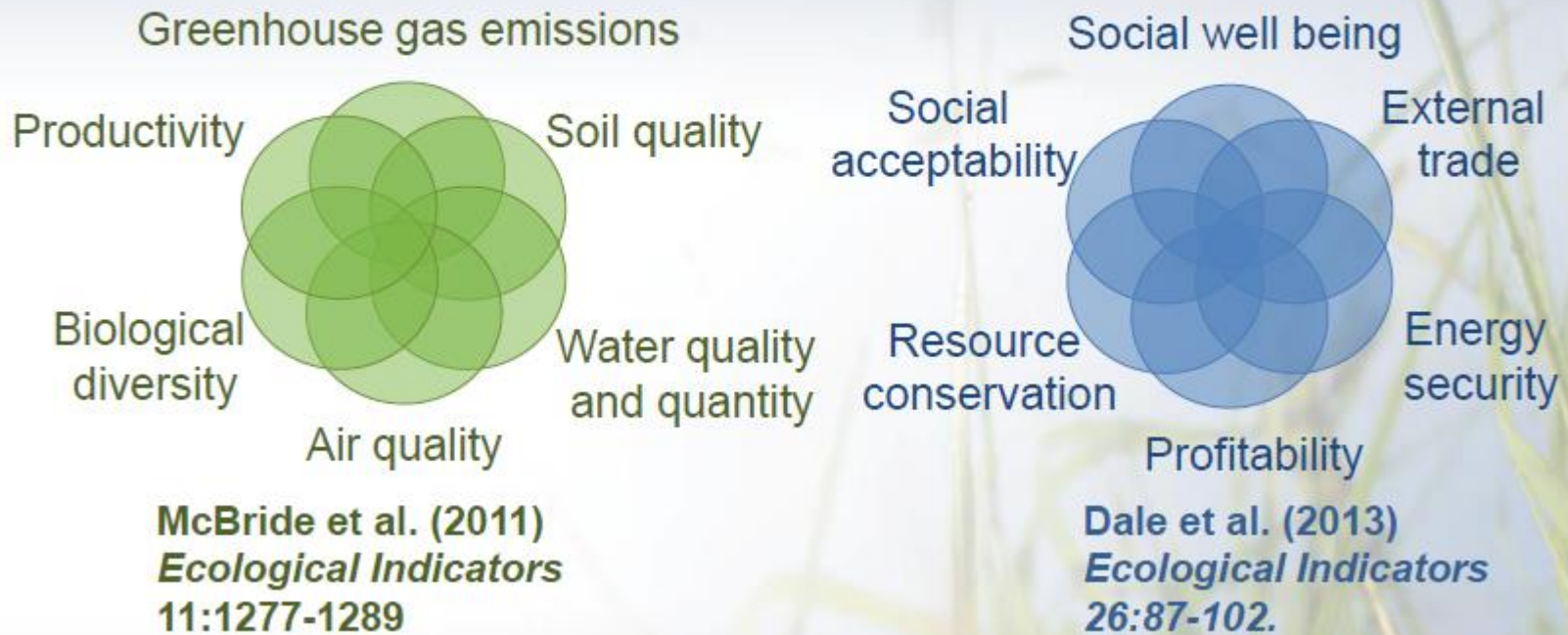
Common to all fields:

- Important for guiding methods to use and data to collect/generate, thereby shaping monitoring, evaluation/validation
 - Meta-validity depends on the indicators set used
- “Indicators” is frequently used at the **science-practice interface**

In SI:

- SI is truly a sustainability concept, but current indicator sets/framework has **not clearly, coherently driven from the current knowledge of system sustainability**
 - Are 3, or 6, or 9, or etc. indicators enough for SI?
 - Is just adding aspects of biophysical and socioeconomic side-by-side enough?
 - What works at what level?
 - How to deal with conflicts between different indicators

Common categories for environmental and socioeconomic sustainability



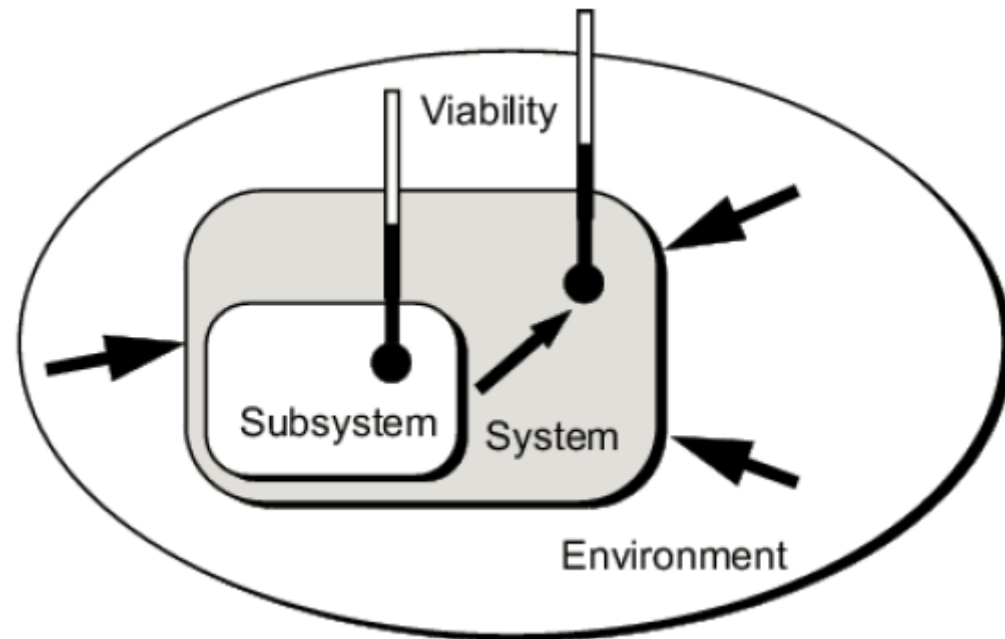
Concrete expected ecosystem services
Essential social and economic aspects
(e.g. social equity and acceptability,
profitability) are missing.

More in sustainability goals
Does it cover all essential aspects?

Let's start from a basic system knowledge: What determines System Sustainability?

Sustainability of a system is determined by:

- its characteristic system structure & functions
- AND**
- the characteristic properties of its particular environment and of the other systems in this environment



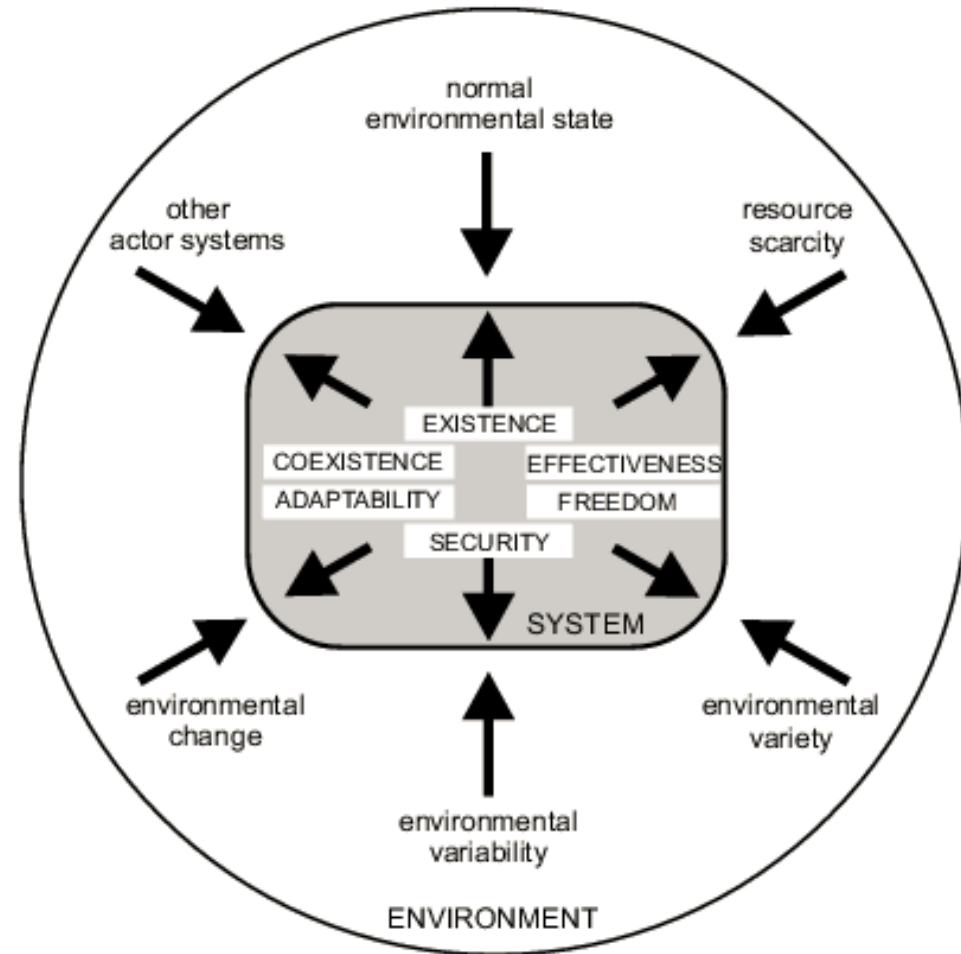
Bossel (2000, 2007): Systems and Models: Complexity, Dynamics, Evolution, Sustainability

System Orientors and Orientor-based Management for Transition to Sustainability

Based on system orientation theory Bossel (2001, 2007) identified six basic orientors: existence, effectiveness, freedom of action, security, adaptability, and coexistence.

Why basic:

- Obviously essential: Coherently derived from all fundamental aspects of system viability and performance.
- Minimum: can not be reduced further as these aspects are uniquely required and cannot substitute each others (irreplaceable).



System Sustainability Orientors (SSO) as the Basis

Categories of Systems Sustainability

- **EXISTTENCE:** Is the intensified system able to exist in its socio-ecological environment?
- **EFFECTIVENESS:** Does the intensified system deal well with the resource scarcity (water, nutrient, energy)?
- **FREEDOM OF ACTION:** Does the intensified system have the freedom and ability to respond to environmental variety (including shock and stress)?
- **SECURITY/MANAGED RISK:** Is the intensified system safe, and stable despite a variable and unpredictable socio-ecological environment?
- **ADAPTABILITY:** Can the intensified system adapt to new challenges from its changing environment? (capacity-focused)
- **CO-EXISTENCE:** Is the intensified system compatible with others interacting systems?
- **PSYCHOLOGICAL NEEDS:** Does the intensification create unacceptable conflicts with people' values, identities?

Theoretical plausibility of SSO: it reflects other system theories relevant for sustainability

Basic Orientors (Bossel 2001, 2007)	Psychol. & Social Needs (Max-Neef 1991)	Cultural theory, Lifestyle (Thompson et al. 1990)	Social System (Luhmann)	Ecosystem Ecology (Mueller, Fath 1998; and many others)	Other relevant system theories... (continued to be added)
EXISTENCE	subsistence	fatalist	Environmental compatibility	Stability domain	...
EFFECTIVENESS	Understanding, leisure	organization	code, program	Uptake, conversion and cycling efficiencies	...
FREEDOM OF ACTION	freedom	individualist	variety	Heterogeneity, diversity	...
SECURITY	protection	hierarchist	redundancy	Redundancy, storage	...
ADAPTABILITY	creation	innovators	autopoiesis	Generic diversity, patch	...
COEXISTENCE	participation	egalitarian	double contingency	Landscape gradients, mosaics, ecotone structure	...
PSYCHO. NEEDS	Affection, identity	hermit	reflection		...

Our work next – Step 1

EXISTENCE	EFFECTINESS	FREEDOM OF ACTION	SECURITY	ADAPTABILITY	COEXISTENCE	PSYCHO. NEEDS

- Use this table as a framework to review current pubs in SI:
- Grouping indicators collected from current SI pubs
 - How they meet S.M.A.R.T criteria (S= specific, M= measureable, A= Achievable, R= Relevant, T= time bound)
 - What are already good and should be used/inherited
 - Gaps needed to be filled

Our work next – Step 2

EXISTENCE	EFFECTINESS	FREEDOM OF ACTION	SECURITY	ADAPTABILITY	COEXISTENCE	PSYCHO. NEEDS

Use this table, with the focus on the reviewed gap (previous slide) to propose essential indicators missed

Our work next – Step 3

LEVEL / SCALE	EXISTENCE	EFFECTIVENESS	FREEDOM OF ACTION	SECURITY	ADAPTABILITY	COEXISTENCE	PSYCHO. NEEDS
Household-Farm							
Village/Landscape							
Regional							
National/International							

Examine the suitability of indicators along basic scales:
 household-farm → village-landscape → catchment
 → region → country

Our high profile deliverables expected: SI Indicator System to cope with complexity context

EXISTENCE	EFFECTIVE	FREEDOM	EXISTENCE	PSYCHO. NEEDS
A	K	f	B	g
B	N	x		m
H	Z			h

Basic criteria toward Sustainability (including resilience)

Basic/common indicators

Matrix of optional indications for context-specific uses, continuously added, updates (provisional check-lists for context-specific pick-up/uses)

Conceptual paper + case-study papers
Guidelines with illustrative cases
Data