Sustainability Standards: A call for reason

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Workshop on
Landscape management and design for food, bioenergy and the bioeconomy: methodology and governance aspects
Gothenburg, Sweden

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DOE Bioenergy Technologies Office
Virginia H. Dale, Chuck Corr, CBES team

http://www.ornl.gov/sci/ees/cbes/

U.S. DEPARTMENT OF ENERGY

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Bioenergy research at ORNL-CBES

- Advance common definitions of environmental & socioeconomic costs & benefits of bioenergy systems
- Quantify opportunities, risks, & tradeoffs associated with sustainable bioenergy production in specific contexts
- Sustainability assessment requires agreements on definitions, criteria, baseline & targets & a manageable set of relevant indicators
- ***Certification ≠ sustainability***

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Enable long-term supply of renewable biomass for clean, domestic bioenergy

“Sustainability” An overused term

The capacity of an activity to continue while maintaining options for future generations and considering environmental, social and economic dimensions (trans-generational equity)

- Context: Priorities vary with place and time (system boundaries)
  - Importing market requires GHG reductions, biodiversity protection
  - Producers want jobs, water quality, economic opportunities
- Always relative: compared to what? Reference case scenarios may pre-determine outcomes
- Trade-offs and choices are ever present
- Analysis and clear communication necessary to support informed decisions

Definitions

- A standard provides requirements, guidelines or characteristics that can be used consistently to ensure that products, processes and services are fit for purpose.

- Reason:
  - a cause or explanation
  - the power of the mind to think, understand, and form judgments by a process of logic.

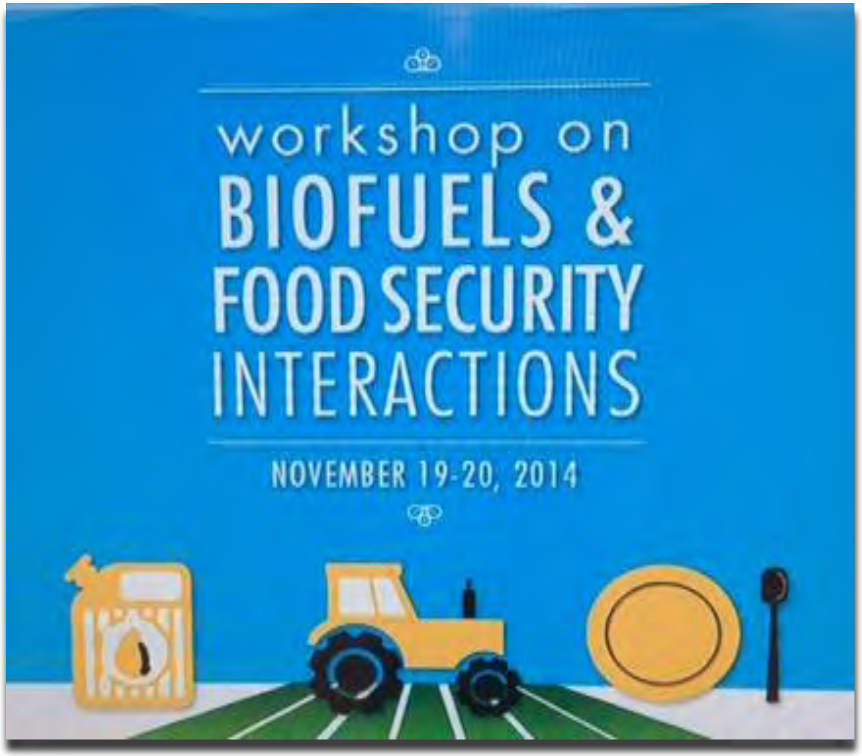
International Standards (ISO): specifications for products, services and good practice, developed through consensus, and designed to reduce trade barriers"

Over 19,500 International Standards.

Food security

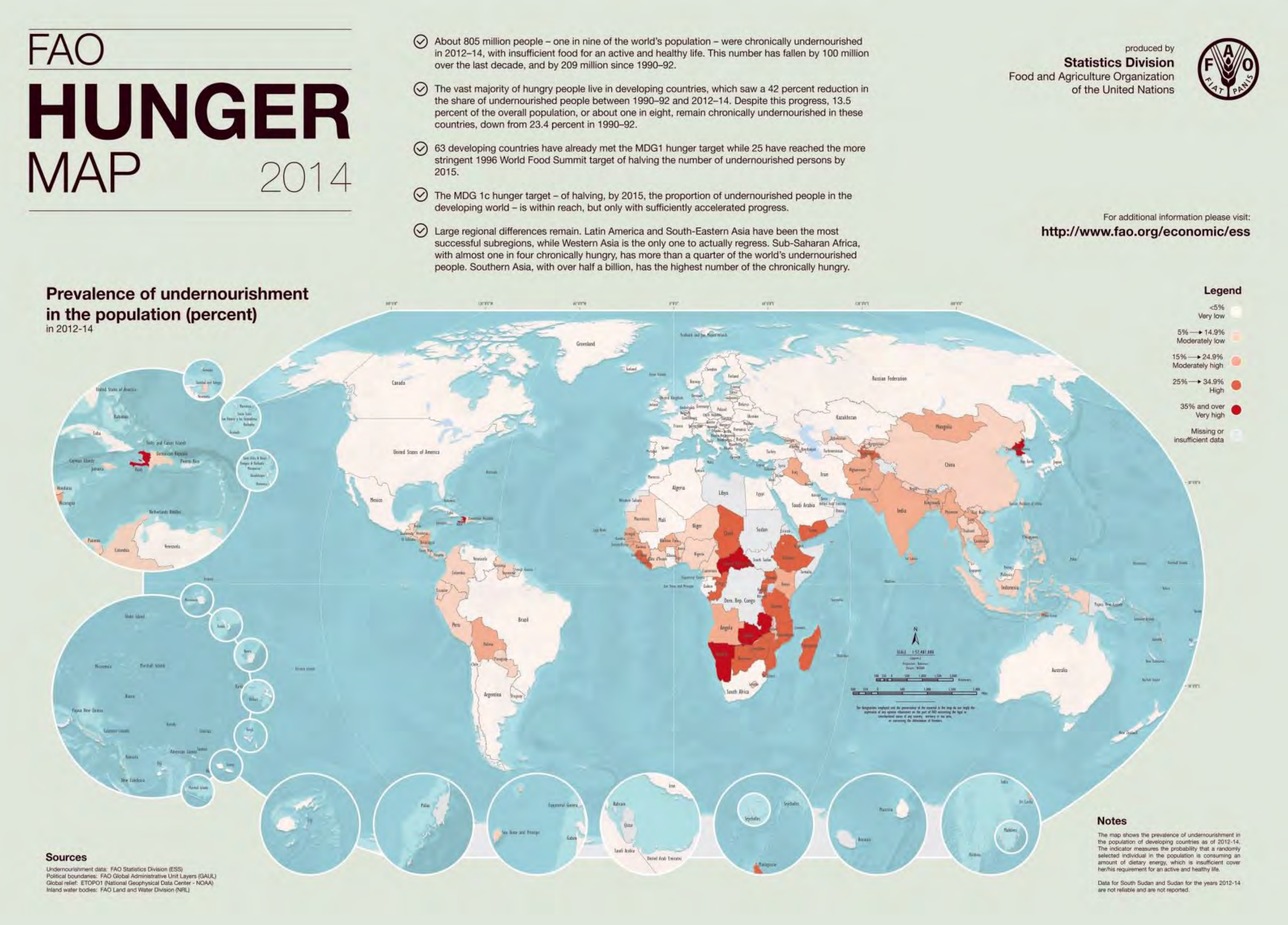
International workshop set forth key issues*

- **Identify synergies – for example**
  - Flex crops (can be used for food or fuel)
  - Infrastructure in rural areas supports food & fuel
  - Sustainability is key to both
- **Frame the problem: Ask the questions that matter**
- **Use clear terminology**
  - See workshop report (link below) and forthcoming publication in GCB-Bioenergy



* http://www.ifpri.org/event/workshop-biofuels-and-food-security-interactions

Under-nourished population decreased in percentage and real terms as biofuel production expanded (2004-14)



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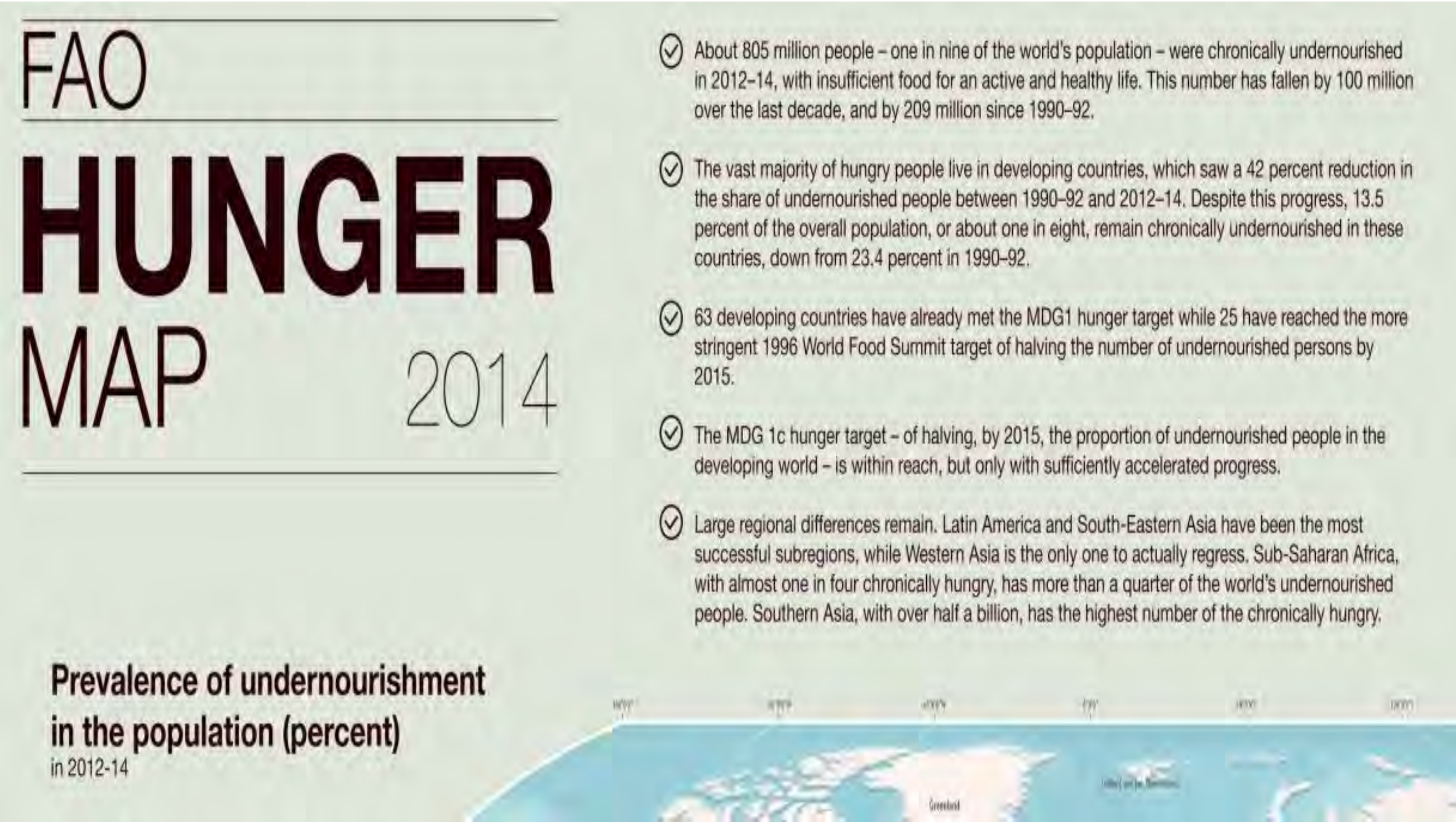


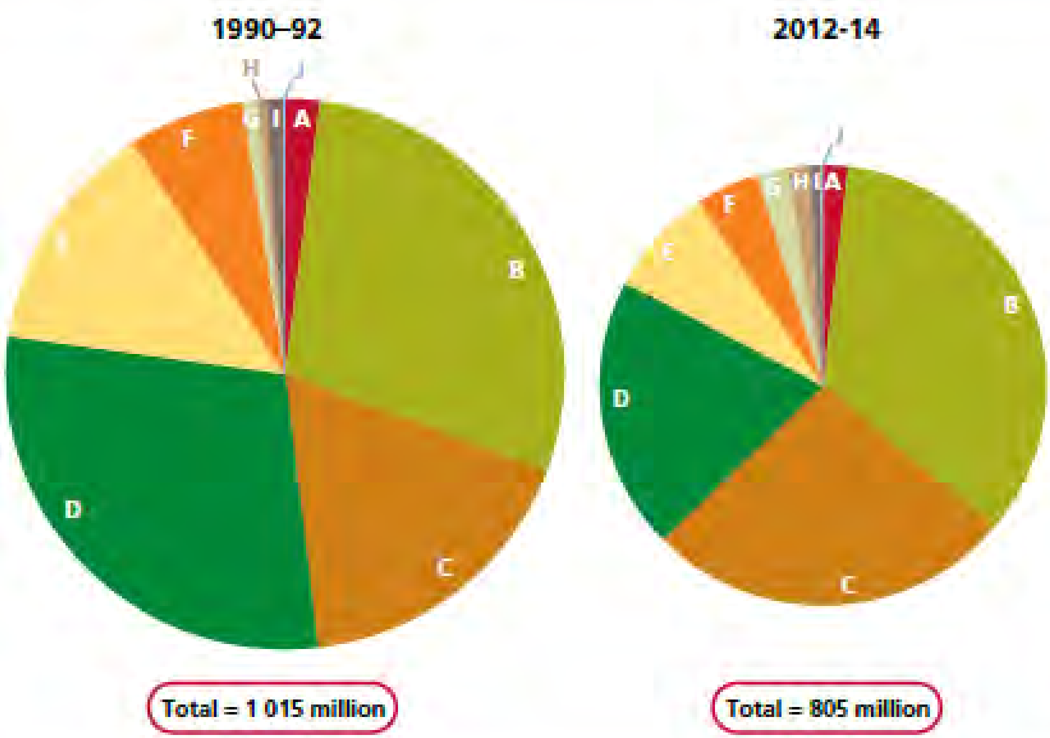
FAO
HUNGER
MAP
2014

Prevalence of undernourishment in the population (percent)
in 2012-14

- About 805 million people – one in nine of the world's population – were chronically undernourished in 2012–14, with insufficient food for an active and healthy life. This number has fallen by 100 million over the last decade, and by 209 million since 1990–92.
- The vast majority of hungry people live in developing countries, which saw a 42 percent reduction in the share of undernourished people between 1990–92 and 2012–14. Despite this progress, 13.5 percent of the overall population, or about one in eight, remain chronically undernourished in these countries, down from 23.4 percent in 1990–92.
- 63 developing countries have already met the MDG1 hunger target while 25 have reached the more stringent 1996 World Food Summit target of halving the number of undernourished persons by 2015.
- The MDG 1c hunger target – of halving, by 2015, the proportion of undernourished people in the developing world – is within reach, but only with sufficiently accelerated progress.
- Large regional differences remain. Latin America and South-Eastern Asia have been the most successful subregions, while Western Asia is the only one to actually regress. Sub-Saharan Africa, with almost one in four chronically hungry, has more than a quarter of the world's undernourished people. Southern Asia, with over half a billion, has the highest number of the chronically hungry.

World Hunger 2014: Most under-nourished people are in Asia and Africa (92%) – and in rural areas

The changing distribution of hunger in the world: numbers and shares of undernourished people by region, 1990–92 and 2012–14

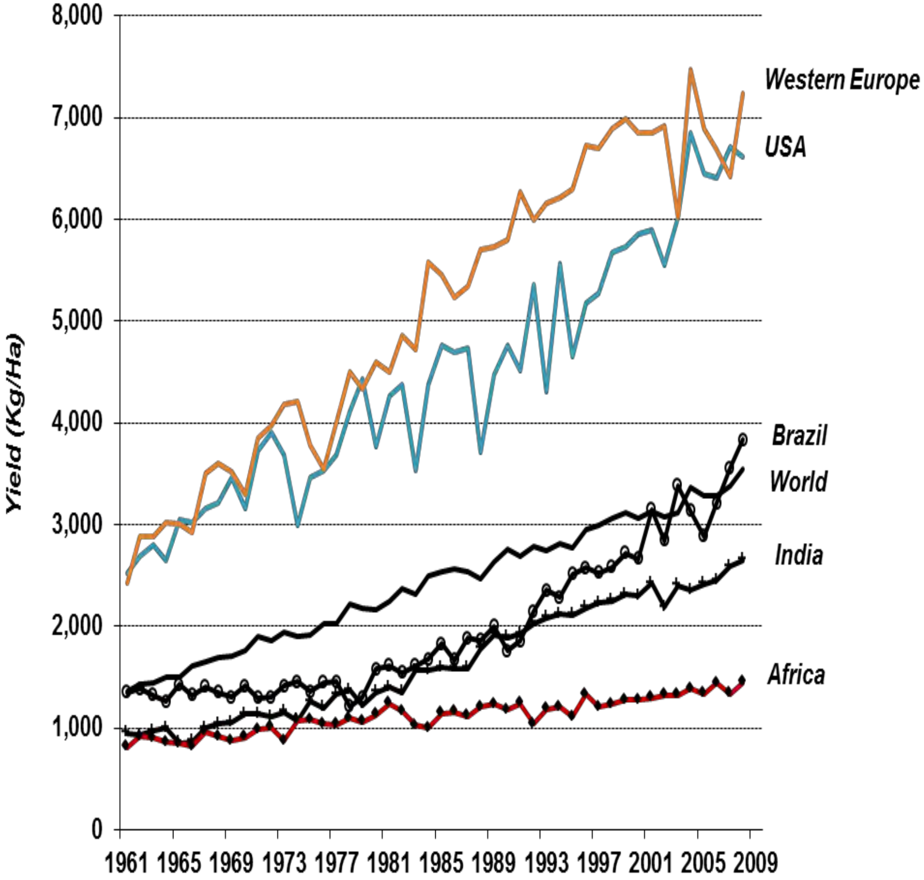


	Number (millions)		Regional share (%)	
	1990–92	2012–14	1990–92	2012–14
A Developed regions	20	15	2.0	1.8
B Southern Asia	292	276	28.8	34.3
C Sub-Saharan Africa	176	214	17.3	26.6
D Eastern Asia	295	161	29.1	20.0
E South-Eastern Asia	138	64	13.6	7.9
F Latin America and the Caribbean	69	37	6.8	4.6
G Western Asia	8	19	0.8	2.3
H Northern Africa	6	13	0.6	1.6
I Caucasus and Central Asia	10	6	0.9	0.7
J Oceania	1	1	0.1	0.2
Total	1015	805	100	100

Note: The areas of the pie charts are proportional to the total number of undernourished in each period. Data for 2012–14 refer to provisional estimates. All figures are rounded.
Source: FAO.

Source: FAO State of Food Insecurity in the World (SOFI) 2014

Experiences with food insecurity suggest:

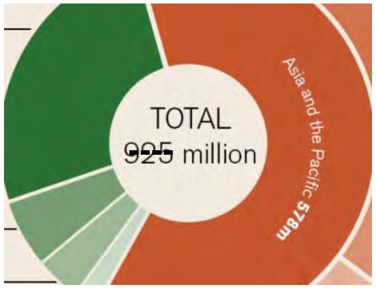


Sources: World Bank (chart); findings adapted from FAO Annual reports on State of Food Insecurity (SOFI) in the World

1. **At global scale, there is plenty of land and food production; distribution and poverty are key.**
2. **Local investment in agriculture and effective social safety nets for the poor are essential.**
3. **Additional factors contributing to food insecurity:**
   - **40+ years of food aid, global over-production**
   - **Lack of market incentives**
   - **Low yields**
   - **Lack of access to financial resources**
   - **Price volatility**

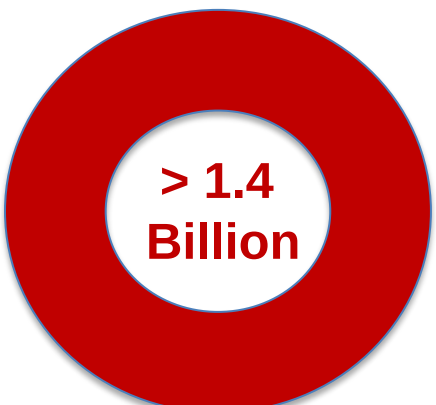
Food for Thought: World Hunger and World Obesity

Food insecure



Now < 800 million

Too much food



WHO: “Overweight and obesity are leading risks for global deaths... linked to more deaths worldwide than underweight”

- 3.4 million adults die each year as a result of being overweight or obese
- 1.5 million children die each year due to malnutrition
- 43 million children under age five are overweight

The population suffering from hunger worldwide has declined to 805 million (FAO 2014) while deaths from diabetes, heart disease and cancer (all associated with eating too much of wrong foods) are increasing.

In 2008, more than 1.4 billion adults, 20 and older, were overweight. At least 500 million adults were obese.

About 165 million children globally are stunted from a vitamin- and mineral-poor diet, inadequate child care, effects of disease and/or not enough food.

Source: WHO Facts on Obesity and Nutrition http://www.who.int/

Resource management ➢ Biofuel sustainability

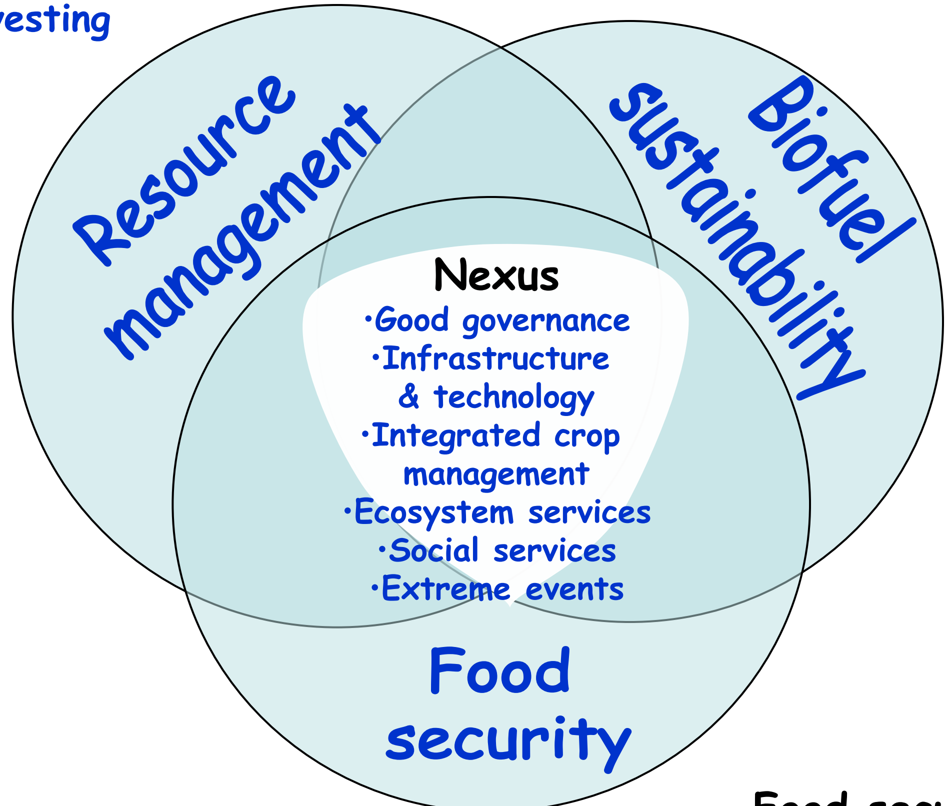
- Increased efficiency & productivity of biomass
- Opportunities & constraints on locations for planting & harvesting

Biofuel sustainability ➢ Resource management

- Reduced greenhouse gas emissions
- Attention to land-use planning & biodiversity
- Incentives for restoration

Resource management ➢ Food security

- Good management underpins food security
- Increased efficiency & productivity of food
- Place-based opportunities & constraints



Biofuel sustainability ➢ Food security

- Income enhancement & diversification
- Energy for food production, processing, & transportation
- Reduced volatility in market prices
- Enhanced sustainability of food crops

Food security ➢ Resource management

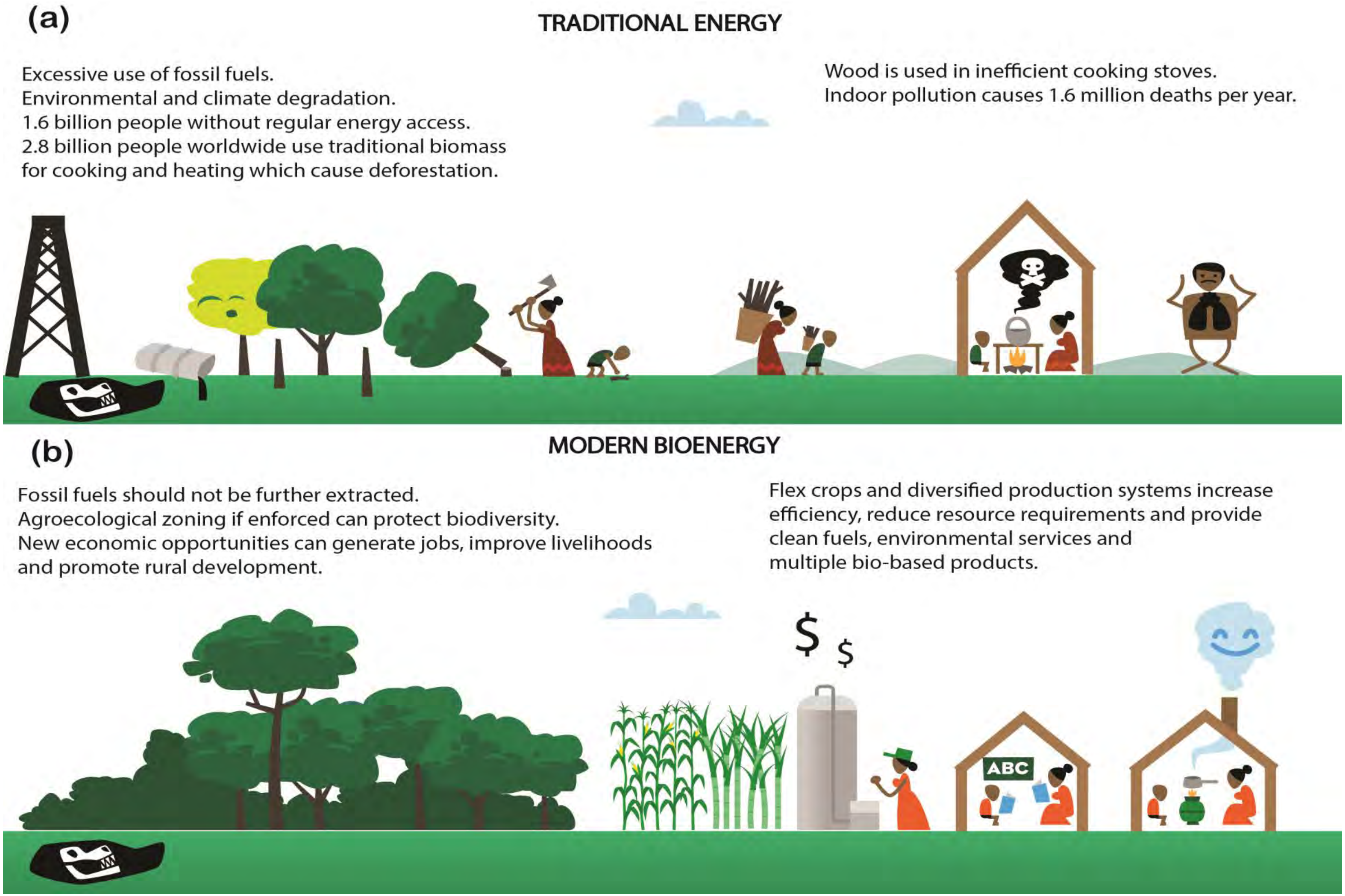
- Secure, healthy diet is a prerequisite for management
- Incentives for restoration
- Reduced pressure on marginal lands

Food security ➢ Biofuel sustainability

- Oversupply cushion required for food security
- Healthy workforce underpins biomass markets

Kline et al. forthcoming in GCB-Bioenergy

Moving from traditional to modern bioenergy



(prepared by Souza for: Kline KL, Msangi S, Dale VH, Woods J, Souza G, Osseweijer P, Clancy J,Hilbert J, Mugera H, McDonnell P, Johnson F (accepted) Reconciling biofuels and food security: priorities for action. GCB-bioenergy (forthcoming)

Opportunities Bioenergy Offers to more Sustainable Food-Energy-Resource Management Systems

- **Better management of renewable resources**
  - Reducing wastes and inefficiencies
  - Existing infrastructure, know-how and technologies
  - Retaining land in agriculture or forest
- **Improving environmental conditions**
  - Soils & water
  - Biodiversity
  - Carbon and GHG
- **Enhancing food & energy security**
  - Conserving fossil energy resources
  - Reducing risk of catastrophes
- **Increasing rates and stability of employment**

Dale and Kline (in review)

ISO 13065, Contents (Outline excerpts)

1. Scope
2. Normative references
3. Terms and definitions
4. General requirements and recomendations…
    - 4.2 Scope of assessment
    - 4.4 Stakeholder involvement
    - 4.5 Relevance and significance
    - 4.8 Science-based approach
    - 4.12 Direct and indirect effects
5. Principles, criteria and indicators (social, economic and environmental)
6. Greenhouse gas methodologies, assessments and comparisons

Annexes

Case study proposed to support IEA T-43 and Inter-Task Project.

Costs, benefits, recommendations for future

Published September 2015 and accessible on ISO website

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IEA Bioenergy Joint Task Meeting Question: "Can certification ensure sustainability?"

"No" because –

1. Nothing can ***ensure*** sustainability.
2. There are many opportunities for substitution in biomass markets
3. Transaction costs for certification, monitoring and verification are high relative to the value of the product (biomass)
4. There is no evidence of sustained political will and necessary "market premiums"
5. Even well-designed schemes can be "gamed," and a few well-publicized cases undermine credibility.

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IEA Joint Bioenergy Tasks Question (modified): "Can certification facilitate sustainability?"

"<u>Yes, it can help *if*</u>" it –

1. Is developed with and adopted by users as a cost-effective tool that meets their needs
2. Provides tools and feedback that guide production toward more sustainable and profitable paths (from users' perspectives)
3. Is designed to adapt to changing contexts and priorities
4. Is inclusive and implemented on a "level playing field" (new entries need political will, financial incentives)

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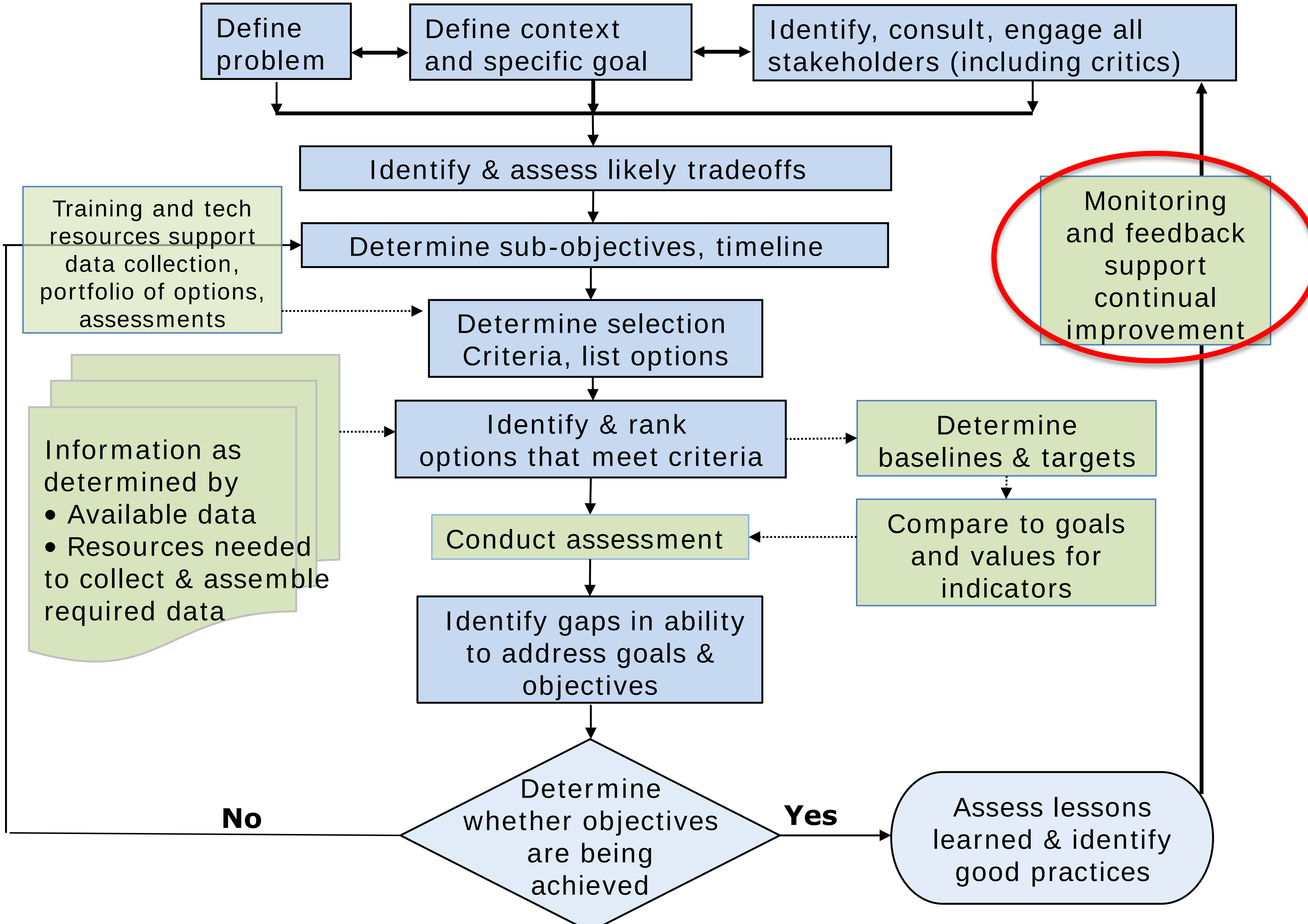
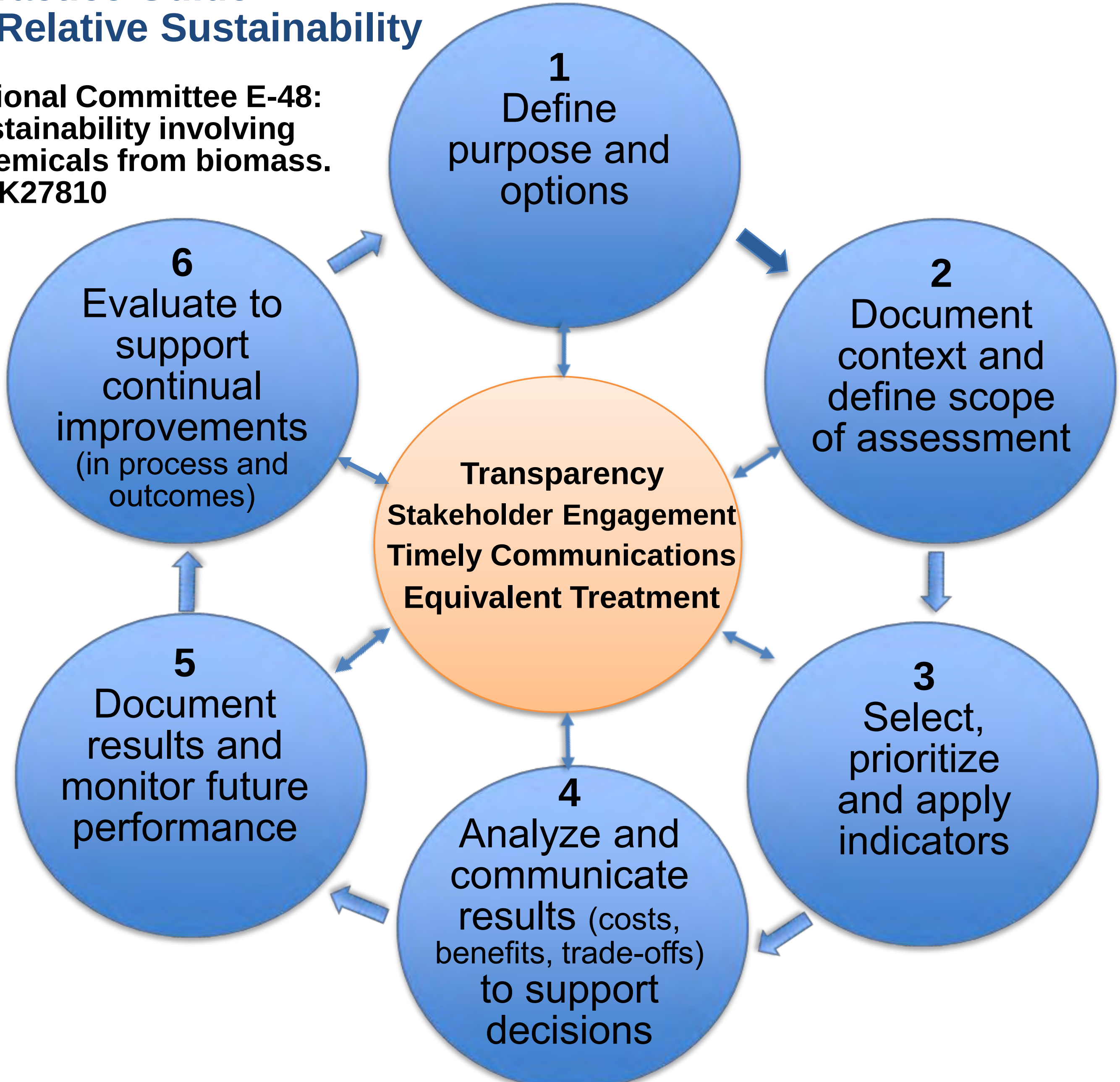
Framework to Support More Sustainable Outcomes



Dale, Efroymson, Kline, Davitt (2015) A framework for selecting indicators of bioenergy sustainability. Biofuels, Bioproducts & Biorefining 9(4):435-416

Standard Practice Guide
Assessing Relative Sustainability

ASTM International Committee E-48: Assessing Sustainability involving energy and chemicals from biomass. Work Item # WK27810 DRAFT



ASTM Standard Practice for Assessing Relative Sustainability

Reason for proposed standard

- Need for clear guidance about fundamental processes and practices that are necessary to assure that assessments:
  - are relevant to local needs and priorities;
  - provide the information necessary to support continual improvement;
  - rely on relevant, replicable, measurable and verifiable indicators: and
  - support fair comparisons and informed choices.
- Most sustainability certification schemes divide products into two segments: those which qualify (meet certification thresholds) and all others that do not. Such approaches can involve significant costs and requirements to determine whether criteria are met but...

Standard Practice Assessing Relative Sustainability

Principles:

1. Sustainability is always a relative proposition involving choices between options or development trajectories;
2. An option can be determined to be favorable compared to another when both options are assessed using appropriate criteria and indicators;
3. The selection of criteria and indicators is not pre-determined but depends on local context, stakeholders and project goals; and
4. Sustainability involves a transparent and iterative process of problem definition, stakeholder engagement, goal-setting, monitoring, adjustment, and reassessment to promote continual improvement.

Science-based analysis

Science: systematic methodology based on evidence and observation

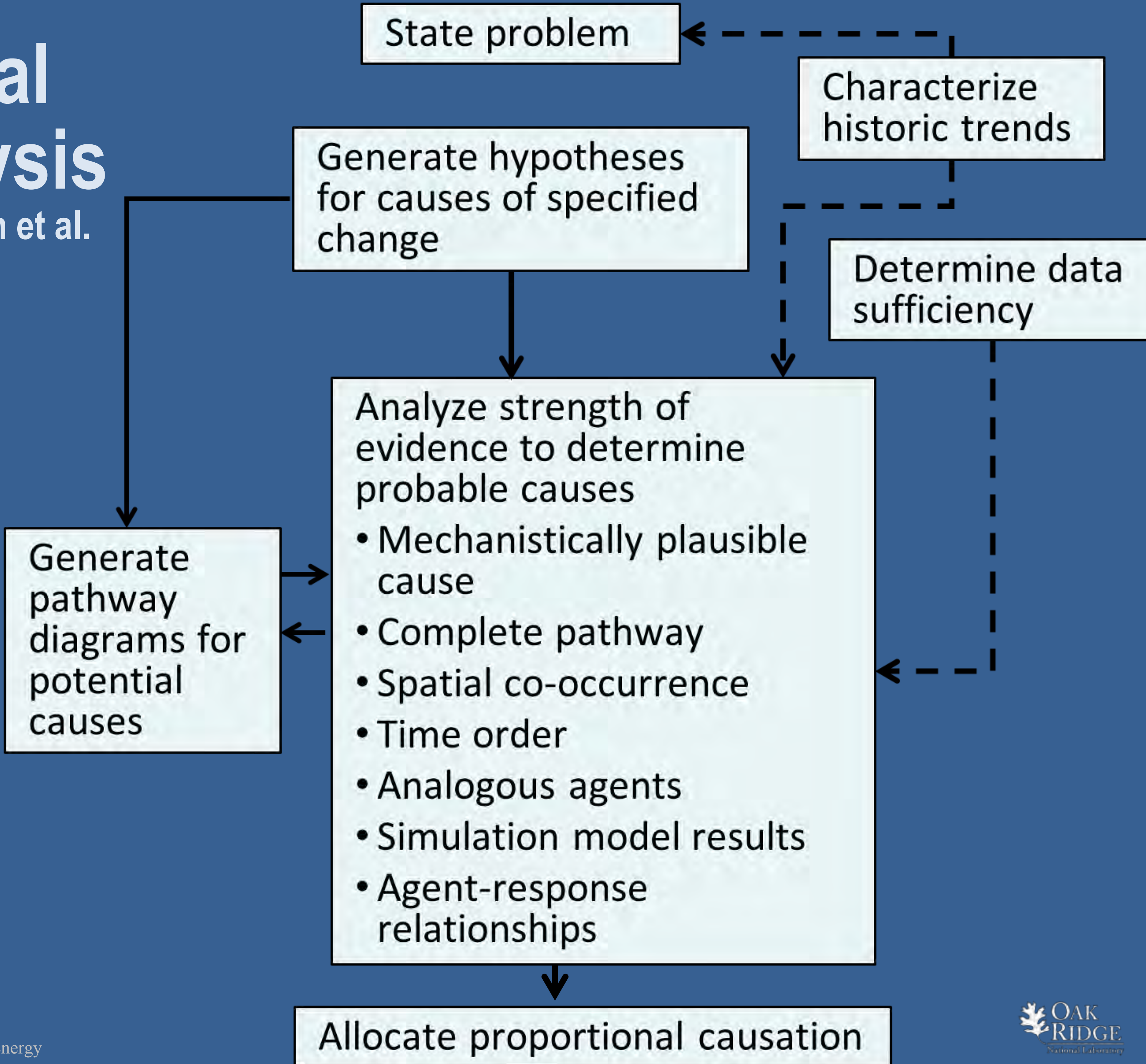
- ✓ Start with clear definition of problem
- ✓ Test hypotheses
- ✓ Conduct critical analysis
- ✓ Determine cause and effect
- ✓ Document verifiable, replicable results
- ✓ Learn from other sectors (epidemiology)

Challenges:

- **Confounding data and terminology**
  - ✓ Land cover versus land uses (multiple)
  - ✓ Crop price and trade versus total production and management
  - ✓ Correlation versus causation
- **Science evolves as new data and understanding become available**
- **Targeted data collection…**

Causal Analysis

(Efroymson et al. submitted)



Bioenergy policy – effects include encouraging "beneficial LUCs"

- Motivation to adopt improved land management practices and invest in improved technologies
- Value chain incentives for increased system efficiencies (total factor productivity)
- Create employment that reduces pressure on isolated forest frontiers (reduced deforestation)
- Biomass valued: reduces loss from fires, disturbances
- Accelerate ongoing shifts to higher performing land and systems
- Increased global scrutiny of illicit land-mgmt activities
- Pressure to apply sustainability criteria and other effects that extend to broader sectors

Conclusions – we have no shortage of biomass

Different places, contexts, needs and goals require distinct solutions.







We need to

- **Learn from experiences**
- **Build partnerships**
- **Develop and apply a suite of metrics that reflect local stakeholder priorities for “sustainability”**

Source: Kline training seminar for Advanced School on Present and Future of BioEnergy; ESPCA – FAPESP – University of Campinas, 10-17 October, 2014. Campinas, SP Brazil.

Thank you

Center for Bioenergy Sustainability

http://www.ornl.gov/sci/ees/cbes/

See CBES website for
- Reports
- Forums on current topics
- Recent publications

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The views in this presentation are those of the author/presenter who is responsible for any errors or omissions.

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Issues in estimating LUC – Update:

1. Definitions: begin with clarifying what is meant by the **L**, **U** and ***C*** of LUC
2. Representation of policy in model specifications
3. Conceptual framework for:
   a) Drivers of initial conversion
   b) Constraints, limiting factors (land, labor, market demand)
4. Land supply, productivity and management specifications
5. Economic decision-making assumptions
6. Assumed and modeled change dynamics
   a) Baseline choice
   b) Reference scenario(s)
   c) Fire and other major disturbance regimes (anthropogenic, natural)
7. Modeling yield, efficiency, and technology changes in response to…
8. Issues of time, scale (analytical boundaries)
9. Discerning correlation, contribution (rate change), causation
10. Many, many **data** issues

Conclusion: take care in discussing land use, land cover, and change.

Source: Kline for IEA Bioenergy Inter-task meetings on LUC, Sept. 2011; Campinas, Brazil

SUSTAINABLE DEVELOPMENT GOALS

17 GOALS TO TRANSFORM OUR WORLD

>160 indicators
some based on collected UN stats

http://sd.iisd.org/news/iaeg-sdgs-sets-workplan-for-finalizing-indicator

Sustainable bioeconomy contributes to SDGs related to: food security and nutrition (**Goal 2**), healthy lives (**Goal 3**), water and sanitation (**Goal 6**), affordable and clean energy (**Goal 7**), sustainable consumption and production (**Goal 12**), climate change (**Goal 13**), oceans, seas and marine resources (**Goal 14**), and terrestrial ecosystems, forests, desertification, land degradation, and biodiversity (**Goal 15**)

Thoughts for discussion

- Many studies of global biomass potential begin with assumed limitations of land. Is land really the constraint to biomass production?
  - Social, political, economic/market issues
  - Institutions, governance, water…
- Needed: Incentives for improved soil/water (resource) management
  - Increase carbon and nutrient retention
  - And capacity to store carbon
- On the sustainability radar:
  - Integrated land-use plans and production systems (ILUP)
  - Urban food-energy systems for nutrient, water and energy recycling

Source: Kline presentation to “Pathways to Climate Solutions: Assessing Energy Technology and Policy Innovation” Workshop organized by the Aspen Global Change Institute; 24-28 February, 2014. Aspen CO.