

# **A New Sustainable Environmental Education Toolbox for Botanic Gardens, Parks & Arboreta**

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# Workshop Elements:

- Understand Environmental- (EE) vs. Education for Sustainability Development (ESD)
- Mechanics of Building an EE or ESD Program
- Thinking Tools For EE and ESD
- Physical, Infrastructural, Technological or Curricular Tools in EE and ESD
- Maslow's Hierarchy & Circle of Courage
- Formulation of SMART Goals & Objectives
- Programmatic Analysis, Outcomes and Impacts
  - Ecological Engineering
  - Consilience

# Work Group Activities To List:

- Breadth of EE and/or ESD Programs; Consilience
- Extent to which institution works with others to cover flora and fauna
- Virtual vs. physical experiential learning and season peak for each
- Circumscription of Goals and Objectives
- Technologies currently in use; desired
- Evaluation Techniques, outcomes? Impacts?

# ENVIRONMENTAL AND SUSTAINABILITY ED:

- **Environmental Education:** to increase student awareness of ecological processes in his/her biological environment.
  - About the environment- discovery of nature
  - From the environment- medium and venue for discovery and learning
  - For the environment- develops informed concern and positive attitudes (Vrasidas 2007)

# ENVIRONMENTAL Ed and Ed for SUSTAINABLE Development

- **Education for Sustainable Development:** to increase student awareness of all processes, including sociologic, economic and political, that affect the sustainability of everyday activities, implemented through:
  - **Scenario Problem-Solving and Modelling** through use of ontological repositories of environmental case histories to compose scenario presentations whose problem-solving exercises provide experiential education and heightened local relevance. (Macris et al. 2006)

## EE and ESD:

- **Urban Green Planning Exercises and BMPs (best management practices), including virtual, lab, field and blended training methods for:**  
Ecological Land use Planning, Density Leveraging in Transit and Mobility; Complete Streets Design concepts, Smart Growth calculations, Climate Change Literacy and formulation of Action (mitigation/adaptation) Plans, Distributed Renewable Energy Principles, LEED principles, Reduce Emissions from Deforestation & Degradation-(REDD-plus), Urban Agriculture or Forestry.

# Environmental Education Objectives

(UNEP & UNESCO 1976; Kopnina & Meijers 2014 )

**To help individuals/communities acquire:**

- **Awareness-** awareness of and sensitivity to the total environment and its allied problems
- **Knowledge-** basic understanding of the total environment, associated problems and humanity's responsibility and roles
- **Attitude-** social values, concern for environment, and motivation to protect and improve it

# Environmental Education Objectives

(UNEP & UNESCO 1976; Kopnina & Meijers 2014 )

**To help individuals/communities acquire:**

- **Skills-** skills for circumscribing and solving environmental problems
- **Evaluation Ability-** skills in evaluating environmental measures and educational programs in terms of ecological, political, economic, social and educational factors
- **Participation-** a sense of responsibility and urgency regarding environmental problems to ensure appropriate action



# Education for Sustainable Development

(UNEP & UNESCO 1976; Kopnina & Meijers 2014 )

**To help individuals/communities acquire knowledge/best mgmt. practices to maintain:**

- **Human Sustainability-** human capital such as health, education and knowledge
- **Social Sustainability (organizations and networks)** social capital
- **Economic Sustainability** financial capital
- **Natural Sustainability (environ)** natural capital (water, land, air, minerals, flora, fauna)

# Education for Sustainable Development

- Based on principles & values underlying sustainability
- Promotes lifelong learning
- Culturally relevant and appropriate
- Based on local needs, perceptions and conditions but recognizes international ones as well
- Engages formal, non-formal and informal education
- Accommodates evolving nature of sustainability
- Builds civil capacity for community-based decision-making, social tolerance, environmental stewardship, etc.
- Uses a variety of pedagogical techniques that promote participatory learning and higher-order thinking skills.

UNEP & UNESCO 2007

# Which kind of program should we have?

➤ **FIRST: Critically study** your organization:

A. Mission

B. Vision

C. Core Values

D. Institutional Strategic Plan

E. Governing boards, Advisory Council's  
implementation of A-D

# Which kind of program should we have?

- **SECOND**: Determine **how your program best fits within** the mission, vision, core values and organizational strategic plan
- **THIRD**: Examine your clientele and define your target audience
- **FOURTH**: Inventory your Natural Resource, Human (staff), and infrastructural capital
- **FIFTH**: Formulate SMART Goals and Objectives and Evaluation Tools.
- **SIXTH**: Run Program, Evaluate performance, outcomes and impacts.

# Determining Program Types and Potential Audiences: Communication, Education and Participation Actions (modified from Jimenez 2015)

- **Communication re: Education**
  - **Through All Mass Media possible**
  - **To Promote advocacy (political and institutional)**
  - **To Engender environmental Interpretation**
  - **To Offer research-based insights into a situation or condition**

# **Determining Program Types and Potential Audiences Communication, Education and Participation Actions (modified from Jimenez 2015)**

- **Educational Program Target Audiences**
  - General Environmental Education with Schools
  - Specific Training for Trainers (and Teachers)
  - Targeted Training for Strategic Stakeholders
    - Government officials
    - Green Industry practitioners
    - Volunteers, aficionados, and other residents

# **Determining Program Types and Potential Audiences Communication, Education and Participation Actions (modified from Jimenez 2015)**

## **➤ Participation Dynamics**

- Volunteering of ideas from participants
- Proposals and suggestions to policymakers
- Interactive participation toward consensus
- SWOT, (Strengths, Weakness, Opportunity, Threats)

# Tools for Thinking in EE and ESD (Root-B et al. 2014)

- **Observe:** Sharpen senses to perceive accurately
- **Image:** Create mental images
- **Abstract:** Detect salient features of entities & things
- **Recognize Pattern:** Perceive similarities & differences
- **Form Pattern:** Discover new ways to organize



# Tools for Thinking in EE and ESD (Root-B et al. 2014)

- **Analogizing:** Discover functional similarities among very different things
- **Body Thinking:** Reason with muscles, memory, gut feelings and emotional states
- **Empathizing:** Become the “thing” you study

# Tools for Thinking in EE and ESD (Root-B et al. 2014)

- **Dimensional Thinking:** Translate among dimensions, space, and time.
- **Modelling:** Creating a miniature analog of a complex system to provide a 3-D interpretive tool
- **Playing:** Conduct an activity without a goal, incidentally developing a skill, knowledge or intuition

# Tools for Thinking in EE and ESD (Root-B et al. 2014)

- **Transforming:** Using any combination of tools for thinking in a serial (additive) or integrated (multiplicative) manner
- **Synthesizing:** Knowing in multiple ways simultaneously: bodily, intuitively, & subjectively as well as mentally, explicitly and objectively.

# Physical, Infrastructural, Technological or Curricular Tools in EE and ESD

- **Traveling “boxes”** on butterflies, songbirds, ecosystems, pollution, etc.
- **Public Service Announcement Formulation** (Cognitive Psych; attitudes)
- **ICT (Information & Communication Technologies)**- e.g., virtual tours; virtual museums; interactive displays; podcasts, audio tours

# Physical, Infrastructural, Technological or Curricular Tools in EE and ESD

## ➤ Live Virtual Learning

➤ **JASON Learning** <https://www.jason.org/live>,

➤ **Wildlife Webcams:**

<http://www.worldlandtrust.org/webcams>

➤ **Monterrey Bay Aquarium**

<http://www.montereybayaquarium.org/animals-and-experiences/live-web-cams>

➤ **Smithsonian Webcams:**

<http://www.earthcam.net/projects/smithsonian/> ;  
<http://nationalzoo.si.edu/animals/webcams/>

# Physical, Infrastructural, Technological or Curricular Tools in EE and ESD

- **Learnscaapes:** Interactive, “living laboratories” designed to provoke exploration, interpretation; e.g., St. Louis Ozone Gardens at St. Louis Science Center. **Also,** Community Gardens on urban farms and in Parks as learning venues.
- **Ecological Art:** Encourages systemic learning processes, sharing of perspectives, stakeholder empowerment through participatory discovery and shared experiences.

# Physical, Infrastructural, Technological or Curricular Tools in EE and ESD

## ➤ **Mobile Applications for Smartphones and tablets:**

Taken to the field, permit instantaneous ID exercises and other related experiences.

- LeafSnap <http://leafsnap.com/>
- Florida-Friendly Landscaping™ Guide <https://ffl.ifas.ufl.edu/plants>
- Bugs Count App <http://www.opalexplorenature.org/bugs-app>
- Plantnet <http://www.plantnet-project.org/papyrus.php?langue=en>

# Critical Curricular Elements in EE & ESD

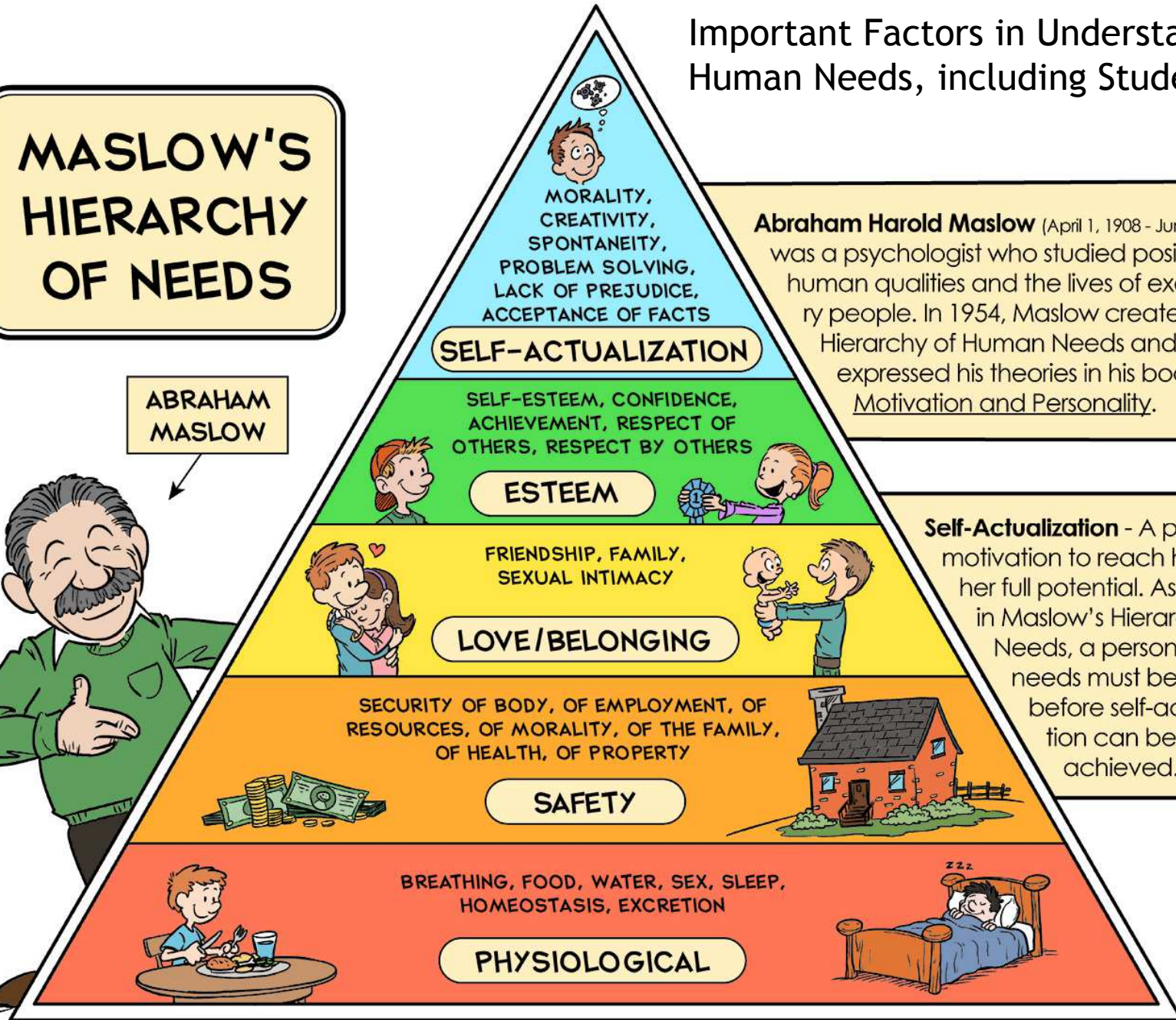
- Pro-Environmental Behavior via Value-Belief-Norm Theory
- Environmental & Social Justice
- Urban Public Mental and Physical Health
- Natural Resource Conservation
- “Civic Ecology,” “Environmental Identity”
- Ecological Place-Based Learning
- “Edutainment” → ecotourism → education → stewardship



# Important Factors in Understanding Human Needs, including Students

## MASLOW'S HIERARCHY OF NEEDS

ABRAHAM MASLOW



**Abraham Harold Maslow** (April 1, 1908 - June 8, 1970) was a psychologist who studied positive human qualities and the lives of exemplary people. In 1954, Maslow created the Hierarchy of Human Needs and expressed his theories in his book, *Motivation and Personality*.

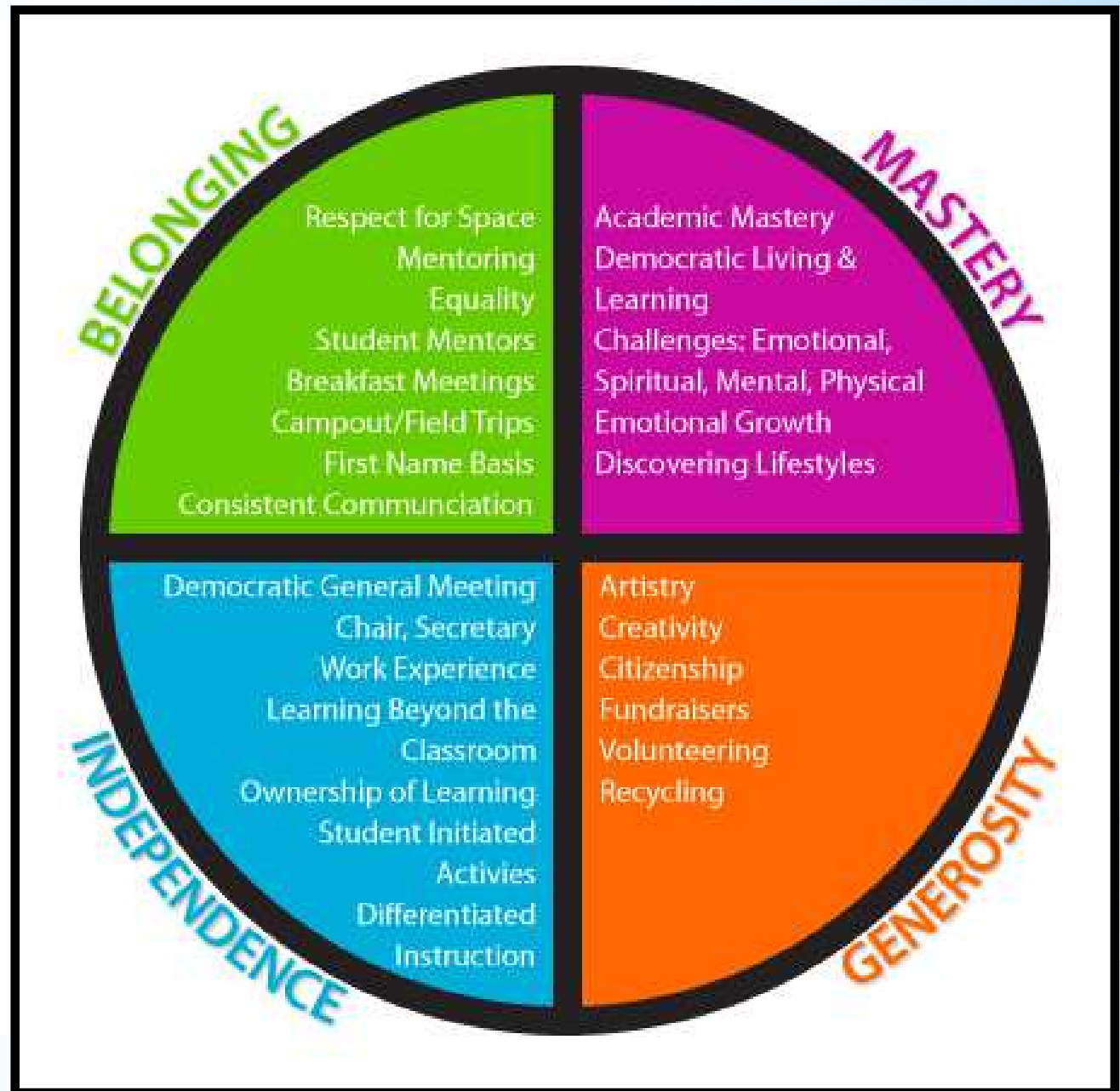
**Self-Actualization** - A person's motivation to reach his or her full potential. As shown in Maslow's Hierarchy of Needs, a person's basic needs must be met before self-actualization can be achieved.

# Critical Social Elements for Youth Ed

## Circle of Courage-

Developed by a M. Brokenleg and L. Brendtro, Native American and another teacher, focused on needs of youth

<https://www.reclaiming.com/content/aboutcircleofcourage>



# Critical Elements for Youth Ed

- **National and Other Education Standards – e.g.,**
  - US Voluntary National Standards  
<http://www.educationworld.com/standards/national/>
  - Common Core State Standards Initiative-  
<http://www.corestandards.org/read-the-standards/>
  - Key Competencies for a Changing World <http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1429586513816&uri=URISERV:ef0020>
  - ASEAN in Today's World <http://www.isc.kyushu-u.ac.jp/astw/index.htm>
  - Association for Supervision and Curriculum Development  
<http://www.ascd.org/publications/educational-leadership/sept04/vol62/num01/toc.aspx>

# Formulation of SMART Goals and Objectives

- **GOAL-** a broad learning outcome and concept to be achieved defined generally
- **OBJECTIVE-** specific skills, values, and attitudes students should exhibit that reflect the broader goal.

# Formulation of SMART Goals and Objectives

- **Specific-** circumscribe the skill, knowledge, attitude or behavior will be changed and for which audience(s). The goal describes suites of these; the objectives detail specifics for each.
- **Measurable-** how much will be accomplished? How will this be measured (pre-/post tests & follow-up surveys?; inspections of gardens?). Goals will mention general measurements; objectives will describe operations precisely.



# SMART Goals and Objectives

- **Achievable or Attainable-** know the “benchmarks” (performance standards) for your program at comparable institutions, determine what you can achieve within time, staff and budget constraints. For goals, phasing may be necessary while objectives should be operational, annual or within a budgetary cycle.
- **Relevant-** check organizational mission, vision, core values. Goals must link directly, and be made up of specific operational objectives that enable evaluators to determine that mission is being carried out.

# SMART Goals and Objectives

## ➤ Time-Bound-

- The goal should indicate relative time toward program development, but not exceed the current programmatic strategic plan
- The objective must state the exact time frame within which the outcome will be achieved.

# Analysis, Outcomes & Impacts

## ➤ **Determine Outcomes-**

- Knowledge Gain: Pre-/ Post- Exams
- Practice Change: electronic surveys; repeat meetings with students performing tasks, etc.

## ➤ **Document Impacts-**

- **Impact** = Learning + Behavior Change + Results
- **Impact** may be expressed as a change in economic value or efficiency, environmental quality, societal or individual well-being, preferably mentioning dollars, numbers of participants, percentages, etc.



# Possible Impacts from EE or ESD

- **Ecological Engineering-** (Jones 2012) to sustainably integrate human society with natural environment
- **Ethical:** define particulars and codify for best practices
- **Relational:** for adoption must integrate with many disciplines and segments of society
- **Intellectual:** summarize key principles and make them easily understood by all stakeholders

# Possible Impacts from EE or ESD

- **Consilience:** (Wilson 1998; Emery 2003) Knowledge will grow out of interdisciplinary accommodation.
- ***Assumptions:***
  - Unification of facts is possible
  - Sciences, arts and humanities are linked by reduction, from fine arts through humanities to sciences
  - Consilience in economic growth and human well-being through ESD (via evolutionary psychology)
  - Urban green space more accessible through environmental justice

# Possible Impacts from EE or ESD

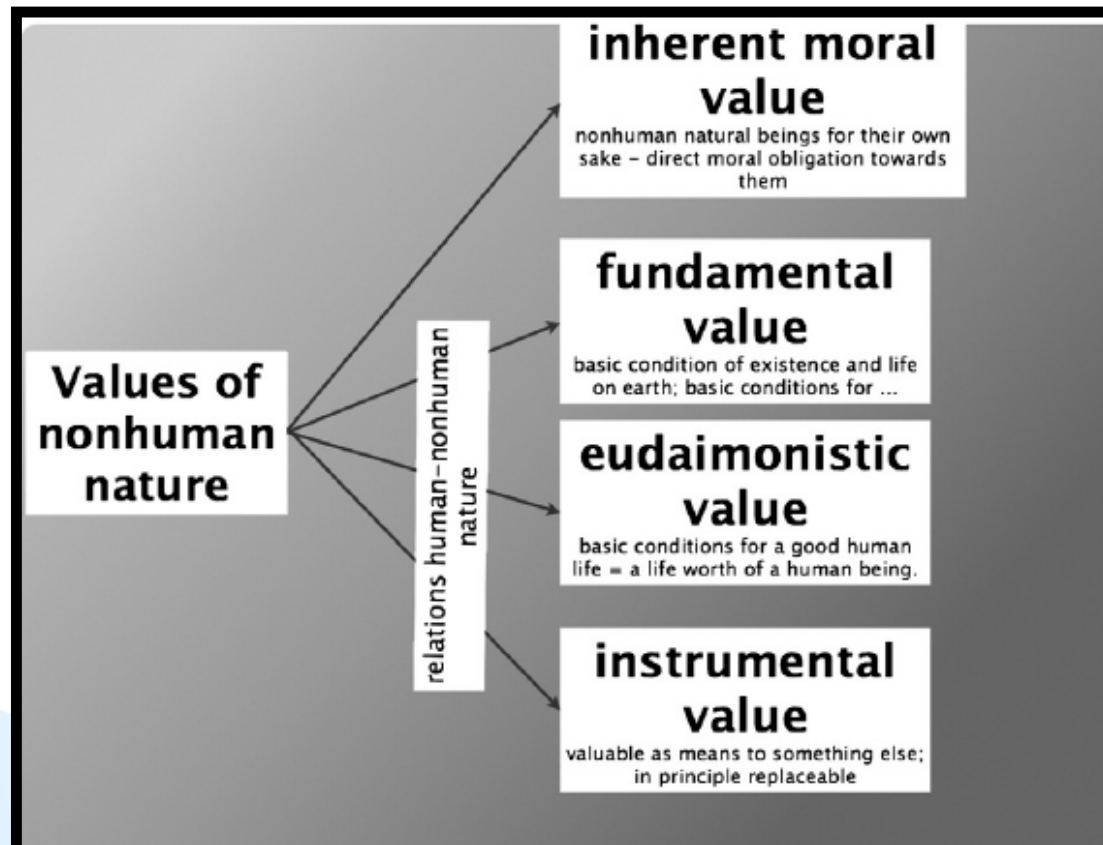
## ➤ **Consilience:**

- Integrating social-ecological systems into EE may permit consilience with ESD
- Community-based social marketing to promote behavioral change
- Citizen scientists as advocates and to bring in specialists from their respective career/societal areas of influence
- Conservation/Restoration scenarios supplemented by EE or ESD students as practica

# Possible Impacts from EE or ESD

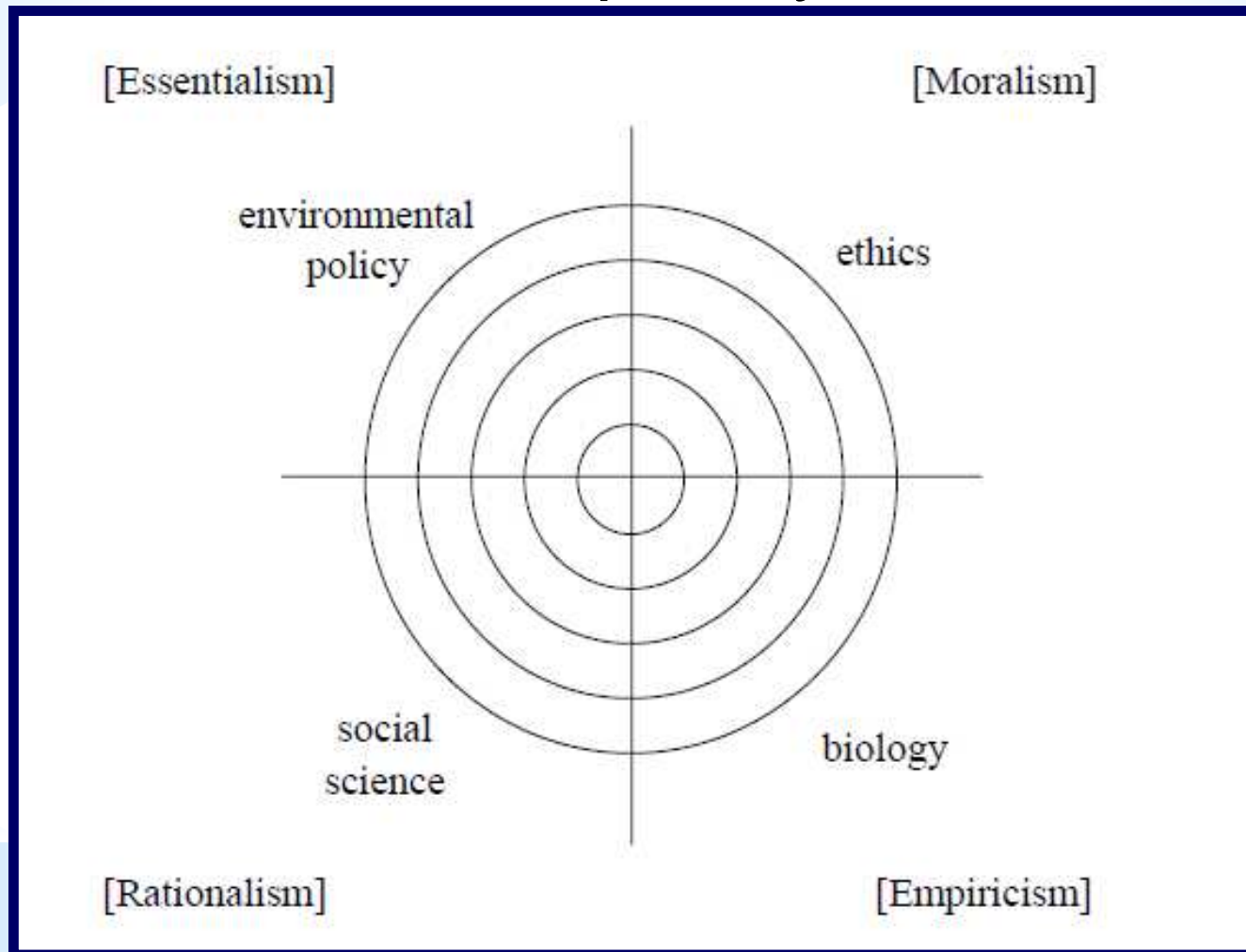
## ➤ **Consilience:**

- Calculations of Ecosystems Services necessarily involves consilience of sectors to provide accurate relative numbers



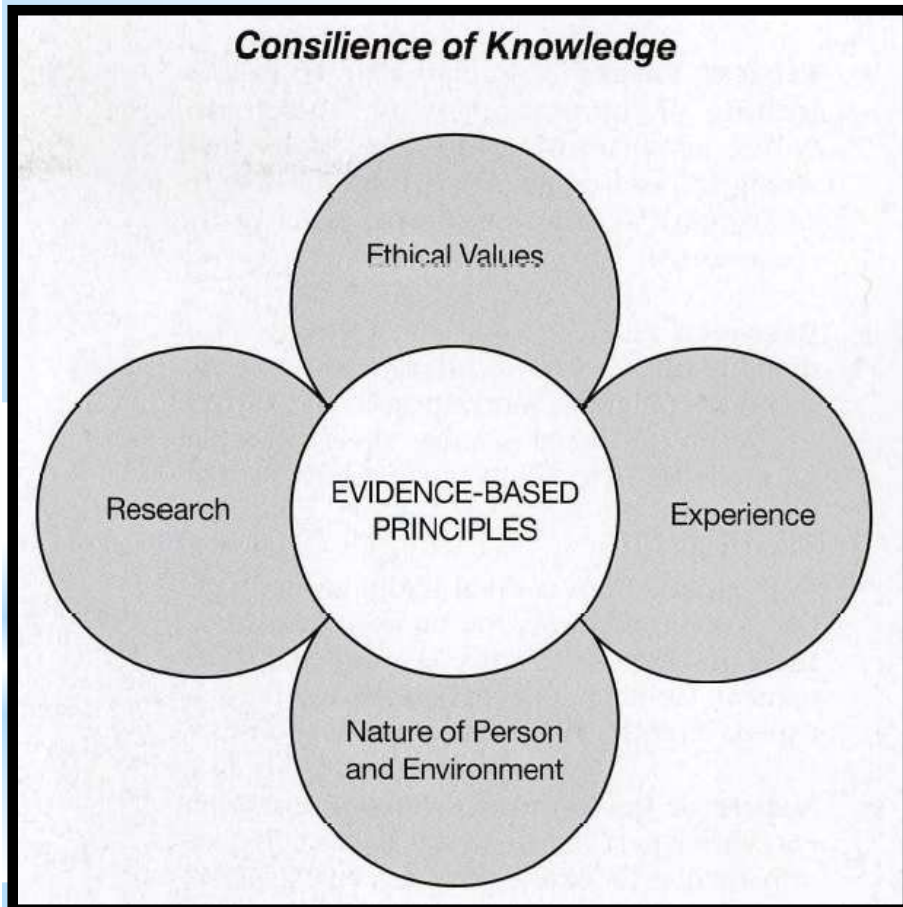
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# Possible Impacts from EE or ESD

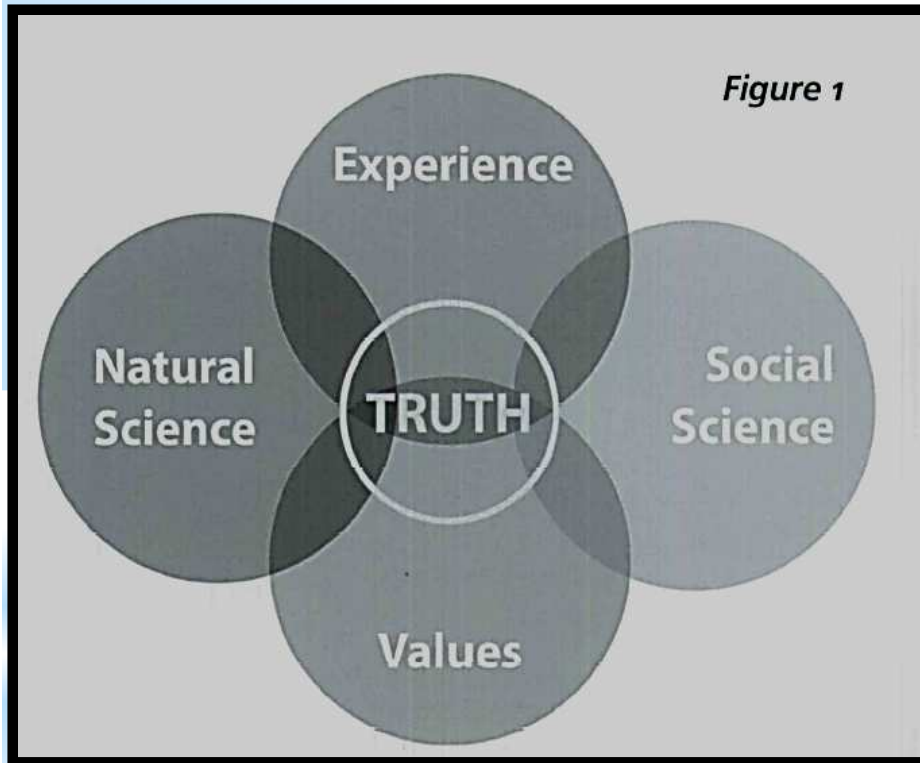
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- Evidence-Based Principles
  - Ethical Values identified by social norms
  - Research provides testing of hypotheses re: efficacy or pragmatism
  - Experience provides testing re: logistical ease
  - Nature of Person & Environ. Provide varying foci

# Possible Impacts from EE or ESD

- **Consilience:** (Wilson 1998; Emery 2003) Knowledge will grow out of interdisciplinary accommodation.



Bendtro & Mitchell 2010

- **TRUTH- Reductionist**
  - From Social Science
  - Through Experience
  - To Natural Science
  - Translated to Values
  - Accepted by Society as “Truth” or current reality.



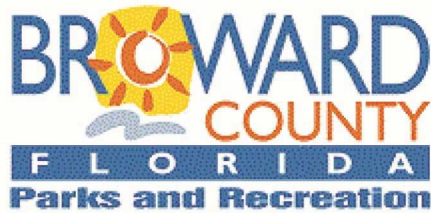
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- Evaluation Techniques, outcomes? Impacts?



# Work Group Activities To List:

- Please separate into SIX GROUPS
- You will have 10 minutes to brainstorm on your assigned topic
- We will collate the results into a single document to be posted on the symposium proceedings webpage.
- Afterward, the results will be circulated to all who have signed attendance to participate in a published review paper.



# Thank you for your participation.

**UF-IFAS Broward County Extension Education Section  
Parks and Recreation Division**

**<http://www.broward.org/PARKS/EXTENSION/URBANHORTICULTURE/Pages/Default.aspx>**

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