Slide 1

Draft only

Slide 2

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Slide 3

Experiential geoethical learning

Slide 4

Qs

?? First experience that
- endeared you to, or
- got you hooked on
- 'geo-stuff' (geosciences, environment, oceans, sustainability, …)

- Travel ?
  - Discovery ?
  - Cultures ?
  - … ?

- Mountains ?
  - Walking ?
  - Skiing ?
  - Beauty, majesty ?
  - … ?

- Sea ?
  - Sailing ?
  - Diving ?
  - … ?

Slide 5

Early experience

Slide 6

Injecting l**earning experience**
into geoethics for
human & natural **sustainability**

David Crookall
Université de Nice Sophia Antipolis, France

Warm thanks to Giuseppe Di Capua, Silvia Peppoloni, Nic Bilham, Eduardo Marone, Marie Charrière, Tony Mayer

Presented at EGU, Vienna, 18 Apr, 2016.

Slide: Plan

Plan

- Ideals, planetary pbs, experiential learning

- Becoming geo-ethical through experiential learning
- The experiential learning cycle
  & examples from simulation/gaming

- New journal

Slide: Ideals, learning, geoethics

Ideals, learning, geoethics

Slide: Ideal

Ideal

- Geoethics, sustainability, CC, etc ➜ in:
  - Every single class in the world
    - Primary → tertiary → professional training
    - All teachers have an ethical obligation to incl geo-dimensions
      – Should not be difficult ??
      – Annotated biblio: International Society for Environmental Ethics
        - (2008), N° of pages 1988 x 9 refs / page = nearly **18k** refs
  - Every media
    - newspaper, TV programme, news broadcast, social network, …
  - Every hotel, station, airport, airline, supermarket, …
- ➜ Bring up all people to behave geoethically, to love & respect their environment
- ➜ Vote for politicians who put the environment first

Slide: Geoethics and the IAPG network

GEOETHICS AND THE IAPG NETWORK

THE ROLE

- the involvement of the community in the idea of a common and shared "geo-heritage", to be considered as a cultural, educational and scientific value, as well as a social capital;
- a cultural renewal in the way we perceive and relate to our Planet;
- the sensitization towards the defense of life and the richness of the Earth.

☐ Geoscientists can promote a culture sensitive to the environment, a correct information on natural risks, a more constructive relationship among scientific community, mass media, civil society and policy-makers.

☐ Geoscientists can persuade people that geo-resources and geo-environment constitute a common heritage, to be considered as a cultural, educational and scientific value, as well as a social capital.

from film by Silvia Peppoloni

Slide: Experience & planetary pbs

Experience & planetary pbs

Slide 13

EGU 2016

"Active planet" needs
➔ Active learning
- If people were as active in learning to respect the planet as they are in plundering it, we would not have arrived at 400+ ppm for CO2

EGU ACTIVE PLANET

Tectonic Plates, Earthquakes, and Volcanoes
Plate Boundaries Volcanoes Earthquakes

Slide 14

Pbs to solve / manage are **massive**

- Climate change
- Dwindling resources
- Carrying capacity
- Pollution
- Envir destruction
- etc etc etc

"We're in a unique moment in the history of the human species. We're on the edge of a cliff."-Chomsky

Step Back from Climate Catastrophe!
#FossilFree #NoKXL #StopFracking

- So the means & **solutions** need to be huge
  ➔ Massive, world-wide adoption of geo-ethical principles, practices, life-style, ethos, in all areas – later slides

Slide 15

Planet-threatening problems; collapse

- Resource depletion, carrying capacity limits
- Climate change, sea-level rise, drought

The Ghost in the Machine
by Arthur Koestler
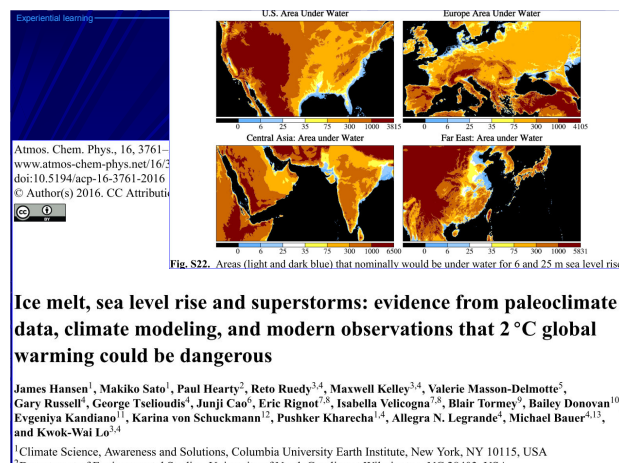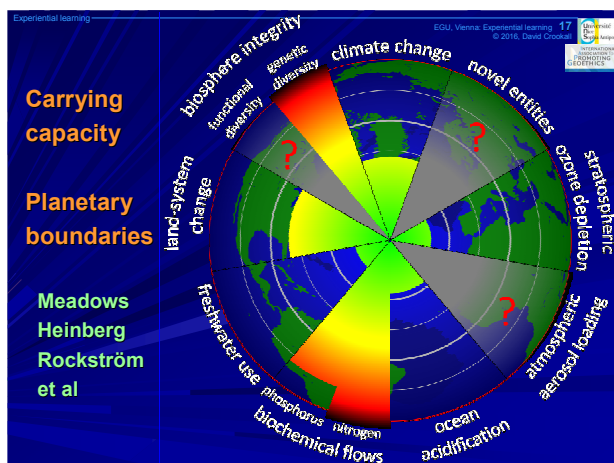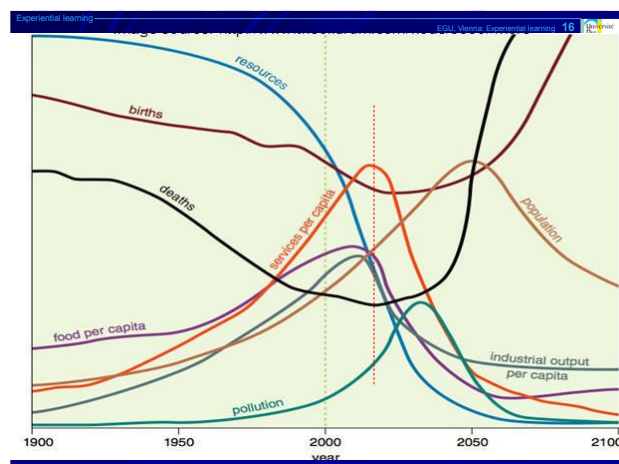Arrow (A Division of Random House Group)

ARTHUR KOESTLER
JANUS
SUMMING UP

LIMITS TO GROWTH
The 30-Year Update
DONELLA MEADOWS | JORGEN RANDERS | DENNIS MEADOWS

STORMS OF MY GRANDCHILDREN
THE TRUTH ABOUT THE COMING CLIMATE CATASTROPHE AND OUR LAST CHANCE TO SAVE HUMANITY
JAMES HANSEN

THE SIXTH EXTINCTION
AN UNNATURAL HISTORY
ELIZABETH KOLBERT

THE END of GROWTH
Adapting to Our New Economic Reality
RICHARD HEINBERG

Slide 16

Slide 17

Carrying capacity

Planetary boundaries

Meadows
Heinberg
Rockström
et al

Slide 18

U.S. Area Under Water   Europe Area Under Water

Central Asia: Area under Water   Far East: Area under Water

Fig. S22. Areas (light and dark blue) that nominally would be under water for 6 and 25 m sea level rise

Ice melt, sea level rise and superstorms: evidence from paleoclimate data, climate modeling, and modern observations that 2 °C global warming could be dangerous

James Hansen[1], Makiko Sato[1], Paul Hearty[2], Reto Ruedy[3,4], Maxwell Kelley[3,4], Valerie Masson-Delmotte[5], Gary Russell[4], George Tselioudis[4], Junji Cao[6], Eric Rignot[7,8], Isabella Velicogna[7,8], Blair Tormey[9], Bailey Donovan[10], Evgeniya Kandiano[11], Karina von Schuckmann[12], Pushker Kharecha[1,4], Allegra N. Legrande[4], Michael Bauer[4,13], and Kwok-Wai Lo[3,4]

[1]Climate Science, Awareness and Solutions, Columbia University Earth Institute, New York, NY 10115, USA
[2]Department of Environmental Studies, University of North Carolina at Wilmington, NC 28403, USA

Slide 1 (top left)

Experiential learning

Guardian

Global warming may be far worse than thought, cloud analysis suggests

Oliver Milman   Thursday 7 April 2016 19.00 BST

Climate change projections have vastly underestimated the role that clouds play, meaning future warming could be far worse than is currently projected, according to new research.

Researchers said that a doubling of carbon dioxide in the Earth's atmosphere compared with pre-industrial times could result in a global temperature increase of up to 5.3C – far warmer than the 4.6C older models predict.

Observational constraints on mixed-phase clouds imply higher climate sensitivity

Ivy Tan[1,*], Trude Storelvmo[1], Mark D. Zelinka[2]

[1]Department of Geology and Geophysics, Yale University, New Haven, CT 06511, USA

[2]Program for Climate Model Diagnosis and Intercomparison, Lawrence Livermore National Laboratory, Livermore, CA 94550, USA.

*Corresponding author. E-mail: ivy.tan@yale.edu

Science 08 Apr 2016:
Vol. 352, Issue 6282, pp. 224-227
DOI: 10.1126/science.aad5300

Science

Slide 2 (top right)

Becoming geo-ethical:

*Through experiential learning
(or learning from experience)*

Slide 3 (middle left)

Experiential learning   EGU, Vienna: Experiential learning 21
                                                  © 2016, David Crookall

Education ≠ Learning

■ Focus on **experiential learning**

  ■ By experience, example, active learning, engagement
    ■ Upbringing (childhood) & everyday life (adulthood)

  ■ [Edu / Schooling: Ministries, classes (desks, textbooks) = prep for exams]
    – Lip service; Disconnected; Inadequate
    – Ivory towers; Leads to little deep learning

■ … despite education

                              ■We can learn without edu
                            ■Result of edu is not always learning

Slide 4 (middle right)

Experiential learning

Experience

■ Types / hierarchies
  of experience

Slide 5 (bottom left)

Experiential learning   EGU, Vienna: Experiential learning 23
                                                  © 2016, David Crookall

Goal of geoethical exper learning

    ■Geo-experiential learning; GeoEthical experiential learning =
      inter-generational
■ Help people (to learn how) to
  ■ create a culture of respect for the Earth
  ■ develop ethics, knowledge, skills, attitudes & bahaviours for
    caring for the environment
  ■ enable humanity to bequeath a decent planet

■ As they grow up (pass on to new generation), they will:
  ■ take care of their environment, for sake of offspring
  ■ fight to protect their environment
  ■ vote for people who protect
  ■ bring up their own kids to care & act with care

Slide 6 (bottom right)

Experiential learning   EGU, Vienna: Experiential learning 24
                                                  © 2016, David Crookall

Long-term; inter-generational

                                    ■ ?? Feasible before
                                      ■before collapse ?? or
                                        irreversible CC ??

        ■Despite the scale of the pb,
■ experiential learning holds some hope
    ■ if experience processed properly
    ■ if widely implemented
    ■ if researched & improved

Slide 25

- Potentially beneficial learning experiences / events

Slide 26

Examples

- Learning, experiences, events
  = huge potential for learning geoethics

  - **if** correct content   AND

  - **if** proper protocols & processing mechanisms?
    – 3Pr's

1. Examples of missed opportunities to learn
   - to learn a deeper geoethics
   …

Slide 27

'Ordinary' classes (2 examples)

Agriculture courses
- How many teach the necessity of
  - Low-carbon agriculture
  - Organic farming
  - Non-GMO (OGM)
    – (Given high agri contribution to CO2 emissions)

In Nice
med school =
no geoethics, no CC!

Business courses
- How many emphasize
  - Green industry, circular economy
  - Internships include sustainability (not CSR)
  - Alternative banking

In my institute = NONE

Slide 28

Disasters

Place?
Nepal
Indonesia (?)

Slide 29

Article about

"The Thai flooding disaster of 2011 and how it affected the insurance industry"

- 5.2 M acres of agricultural land destroyed
- 4 M homes damaged or destroyed
- 7 industrial estates affected
- 13.6 M People affected
- 815 deaths

- N° of learning programmes ???

Slide 30

Hermione

Learning?

Lafayette's
HERMIONE
Voyage
THE YEAR OF ADVENTURE
HAS ARRIVED!
#hermione2015

Internships – what learning?

Colo de vacances, activity holidays
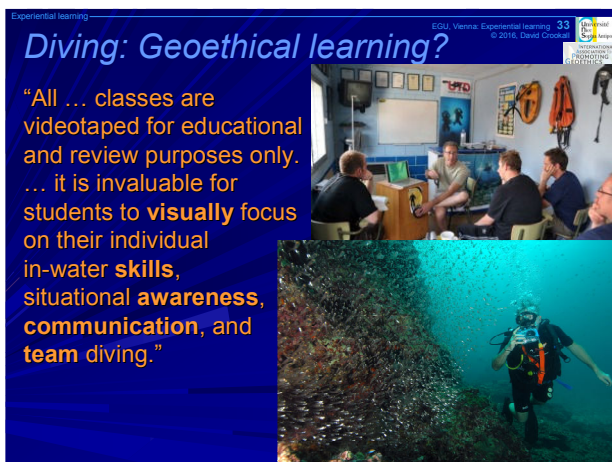
Diving: Geoethical learning?

"All … classes are videotaped for educational and review purposes only. … it is invaluable for students to **visually** focus on their individual in-water **skills**, situational **awareness**, **communication**, and **team** diving."

Slide 34

- Old castle, falling into ruin
  - campus of U of Toulon

In *all* subjects, areas & activites

- Learn envir, geoethics & sustainability
  - in **ALL** subjects

Perfectly possible

Actionable ideas 1

- Subsidizing environmental-care **summer schools** for families and teachers at all levels
- Require cinemas to show envir films

- Require geoethics in:
- Cruises
- All classes
- History
- Maths
- Diving
- Exchange progs
- …

Actionable ideas 2

- Pressuring governments to make geoethics, environmental care and CC central / important **components** of <u>all educational programmes</u> (in, eg, history, language, business, law, medicine, maths, communication, physics, etc)

- Develop geoethical dimensions of **internships**, <u>in all areas</u>

- Design rich affective-cognitive **learning experiences** for grappling with geoethical problems- eg, FISH BANKS, KEEP COOL
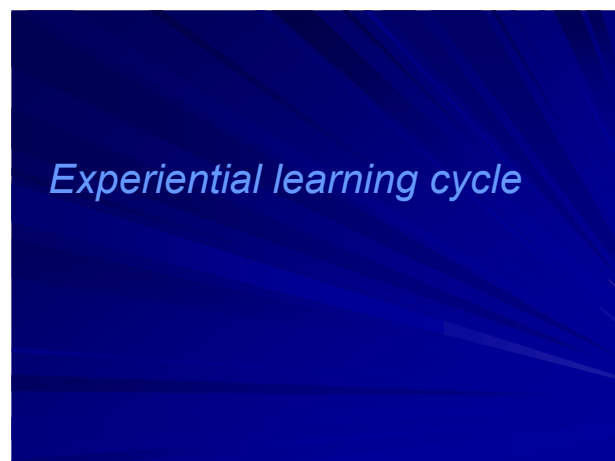
Experiential learning cycle

Processing / transforming exper

Concrete Experience
(doing / having an experience)

Active Experimentation
(planning / trying out what you have learned)

Reflective Observation
(reviewing / reflecting on the experience)

Abstract Conceptualisation
(concluding / learning from the experience)

Jarvis 1994 (reflecting on Kolb)

- The person (1)
- Situation (2)
- Experience (3)
- The person: Reinforced but relatively unchanged (4)
- Practice Experimentation (5)
- Evaluation (8)
- Memorisation (6)
- Reasoning and Reflecting (7)
- The person: Changed and more experienced (9)

- Dave Kolb

Exper ≠ Learn: Take away msg

- **Learning** objectives ≠ **Experience** objective

- **Experience** objectives
  - <u>end</u> when experience ends
    - we do **not** learn in the experience (while the exper is under way)
  - ≠
- **Learning** objectives
  - <u>start</u> when experience ends
    - we learn outside, in breaks in & after the experience

- Experience & learning = 2 separate things
  - Implications for how:
    - we help people learn;
    - we understand results of experience

learning

C

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2. Examples of valid geoethical learning experiences / events
   All above expériences **if done properly**

- Examples from simulation
  + debriefing
  (processing experience to transform it into learning)

Simulation, role-play, gaming
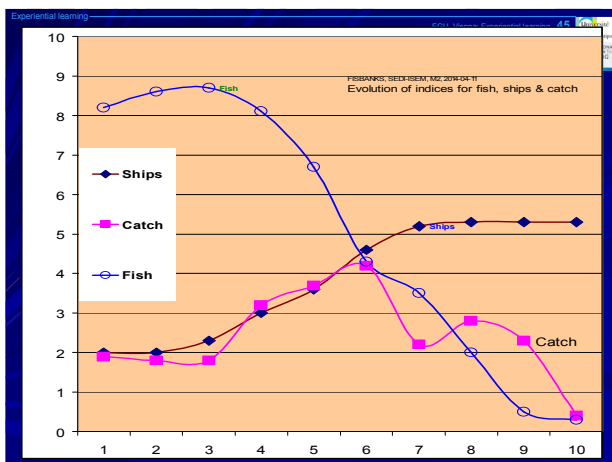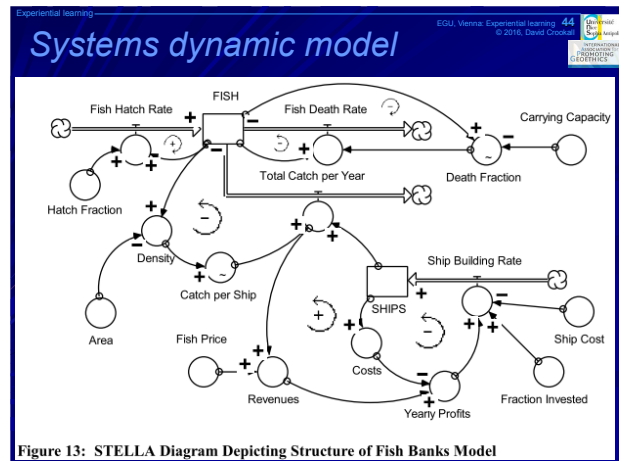
- Example: FISHBANKS (Dennis Meadows)

Slide: Variables

Variables

Participant groups = fishing companies

Computer calculates results

Decisions each round

Annual Report	Year	1	2	3
R:1	Deep Sea Catch (# fish last year)			
R:2	Coast Catch (# fish last year)			
R:3	Price of Fish ($ / fish last year)			
R:4	Total Fish Sales ((R:1 + R:2) x R:3)			
R:5	Interest ($ last year)			
R:6	Initial Bank Balance ($ this year)			
R:7	Ship Fleet Before Auctions and Trades			

Change Number of Ships	Year	1	2	3
D:1	Ships Purchased in Auction			
D:2	Money Spent on Auction			
D:3	Ships Purchased in Trade			
D:4	Money Spent on Purchases			
D:5	Ships Sold in Trade			
D:6	Money Received from Sales			
D:7	New Ships Ordered			

Allocate Ships	Year	1	2	3
D:8	Ship Fleet after Auctions & Trades			
D:9	Ships Sent to Deep Sea			
D:10	Ships Sent to Coast			
D:11	Ships Remaining in Harbor			

Slide 44: Systems dynamic model

Systems dynamic model

Figure 13: STELLA Diagram Depicting Structure of Fish Banks Model

Slide 45

FISBANKS, SEDI-ISEM, M2, 2014-04-11
Evolution of indices for fish, ships & catch

(Legend: Ships, Catch, Fish)

Slide: Debrief — Individual form (start)

Debrief

Individual form:

(start)

Individual debriefing form (c) 2013 by David Crookall, for FISH BANKS, by Dennis Meadows

Name_____ Fishing company_____ Role_____ Date_____
Travaillez **seul(e)** et en **silence**. Rappel: You are **no longer in the simulation**. Think **back** to your time in the simulation. Inscrivez qqs mots & phrases clefs (pas de longues phrases).

1. Quels étaient / sont vos différents **sentiments** / émotions?
   a. **pendant** l'activité (excité, frustré, content, énervé, d'accomplissement, d'appartenance)?

   b. **maintenant**?

2. **Quoi?** Here just **describe**; do **not explain** or interpret. Qu'est ce qui s'est passé pendant l'activité? Do **not** try to explain or interpret here; be descriptive. Consider: Faits, évènements, interactions. Decision processes. Teamwork in your company (clarity of objectives, role clarity, balance, responsibility, listening, etc). Ship allocation strategies used. Your company's achievements. Evolution of the fish stocks. Ship acquisition (purchase, trade, auction). Account keeping. Negotiation with other companies. Trust levels.

3. How well do you feel your company succeeded in the negotiations? How well do you feel the other companies succeeded?

4. A votre avis, **pourquoi**? Raisons & explications des évènements en N°2 et succès ou échec en N°3. What **factors** encouraged success? What factors made things difficult? For example: How did **emotions** influence events? Did **communication** problems influence events? How did **negotiations** influence outcomes? What was the role of **greed** (the desire to become rich, the desire to become rich**er than** others - to 'win' at all costs), and non-concern for next generations.

Slide: Individual form filled out (start)

Individual form filled out

(start)

Slide 48

"Companies want to make the most money without considering our environment."

"The world of tomorrow is put in peril because of irresponsible industry."

18. **Real word.** What analogies can you make wih the real world? what other natural resource commons are being plundered in this way? what kinds of overshoot & collapse are we witnessing today (overshoot-using resources faster than they can regenerate, going beyond the limits of sustainability). (examples: trees, alcohol, urbanization, debt, water, soil, etc). what about tomorrow? what are the main dangers in your lifetime?

Communication entre les entreprises afin de trouver une solution commune pour le bien de tous car dans le monde réel, cela se passe comme ça, toutes les entreprises veulent faire des bénéfices et gagner le maximum d'argent sans prendre considération de notre environnement. Les actes des entreprises touchent bien les autres entreprises concurrentes mais aussi la population. Il faut que les consommateurs manifestent des dangers causés par les entreprises. Le monde de demain est mis en péril à cause de ses industriels irresponsables.

Slide 49:

> "We realized that each decision must be thought through carefully and that, to save our planet, the most important thing is to communicate."

22. Your future. In what ways will this simulation expérience and especially your heightened awareness of the issues, influence your future Outlook and your future career ?

Cela nous permet d'être plus sensible sur la question de respect de l'environnement ! On a pris conscience que chaque décision prise doit être murement réfléchie et que pour sauver notre planète, la première chose à faire c'est de communiquer. Tous ceux qui ne respectent pas les accords doivent être sanctionné.

Etant donné que nous serons bientôt inséré dans le monde professionnel, il faut qu'on se mobilise et qu'on intègre cette problématique concernant l'environnement à nos choix et décisions.

Slide 50:

Compare

- Mstr students
- 2014, France
- No knowledge of sustainability
- No interest in fish or fishing

- Professionals
- 2015, Thailand
- Fishing authorities
- Great interest in sustainable fishing stocks

- Neither know tragedy of the commons

Slide 51: WAT-A-GAME — A method & toolkit for supporting and simulating water management in any catchment

Design, build, explore, discuss, play... with all water stakeholders in your catchment.

Slide 52:

ComMod

- Agent-Based Models + Role-Playing Games
  - Decision processes, common property, co-ordination among actors, etc.
  - Interdisciplinary; Recognition of complexity of systems

- Bycatch diversity : Collective learning on bycatch diversity and management at Kung Krabaen Bay, Chantaburi, Thailand
  - Can a simple gaming and simulation tool be used to raise the awareness of local fishermen on bycatch conservation?
- Cochabamba : Urbanisation and irrigation channels in Bolivia
  - How to facilitate the consultation between irrigators and urban dwellers near irrigation channels in a peri-urban area?

Figure 1: Successive ComMod cycles conducted in Mae Salaep, Chia

* 1 model, 2 forms : Role-Playing Game & Multi-Agent System

Contribution of simulation and gaming to natural resource management issues: An introduction

Olivier Barreteau
Cemagref, France

Christophe Le Page
Pascal Perez
Cirad, France

Nowadays, computer-mediated simulations and games are widely used in the field of natural resource management (NRM). They have proved to be useful for various purposes such as supporting decision-making processes and training. First, the specificities of the NRM research field are highlighted. Then, based on the analysis of the articles presented in this special issue of Simulation & Gaming, *some key features related to the implementation of gaming in such a context are introduced. Finally, after reviewing the benefits of using simulation games in NRM, the authors stress the ethical issue of changing social relationships among stakeholders by playing a game with some of them.*

KEYWORDS: *benefits; context; collective policy design; decision making; ethical issues; implementation; natural resource management (NRM); simulation games, social empowerment;*

Slide 1

An evolving simulation/gaming process to facilitate adaptive watershed management in northern mountainous Thailand

Cécile Barnaud
Paris X-Nanterre University, France

Tanya Promburom
Chiang Mai University, Thailand

Guy Trébuil
François Bousquet
CIRAD, France

The decentralization of natural resource management provides an opportunity for communities to increase their participation in related decision making. Research should propose adapted methodologies enabling the numerous stakeholders of these complex socioecological settings to define their problems and identify agreed-on solutions. This article presents a companion modeling (ComMod) experiment combining role-playing games and multiagent systems conducted in a community in northern Thailand to support collective

Slide 2

2013

Climate Change and Simulation/Gaming: Learning for Survival

David Crookall[1]

If you've heard this before,
don't stop me because I'd like to hear it again.
Graucho Marx

People can't change the truth,
but the truth can change people.
Unknown

Simulation+debriefing & CC

... nvertible;
... deride it,
... here it is.
Winston Churchill

Tell people something they know already and they will thank you for it.
Tell people something new and they will hate you for it.
George Monbiot

Abstract
This editorial outlines a number of connections between climate change and simulation/gaming/debriefing. First, the development of this symposium is mentioned, including

Slide 3

Pb for all geo-experiential learning
Thus need to increase efforts

Climate Change and Four Goals for Operational Gaming

4 obstacles:

1. **Ignorance about CC**
2. **Long time frame for action**
3. **Vested interests**
4. **Increasing demand for energy & resources**

Dennis Meadows[1]

Abstract
This foreword highlights the danger of runaway climate change. It outlines four obstacles that appear to prevent world society from adopting a positive approach to climate change: (a) general ignorance about the dynamics of climate change, (b) the long time frame needed for action to produce effective results, (c) the blocking power of the rich and powerful (those with vested interests in greenhouse gas industries), and (d) the ever increasing worldwide demands for energy and resources. Games can be a powerful tool to help developments move in the right direction.

Slide 4

Climate Urgency

James E. Hansen[1]

Abstract
This composite of two presentations by Dr. Hansen outlines crucial topics in climate research and implores our President to support and defend the rights of young people and future generations. Unless urgent actions are undertaken to curtail fossil fuel emissions, today's children and future generations will inherit a world in which irreversible climate effects are underway and largely out of their control. The tragedy of this situation is that the actions needed to avoid climate problems are economically beneficial for most people—but they are resisted by a powerful fossil fuel industry that uses its financial clout for undue influence on our governments.

Slide 5

Processing envir experience

- Must process the experience to tranform it into learning
  - Unethical, irresponsible & unprofessional not to do

- Implications
  - Introduce / emphasize geoethical dimensions in all areas of society (examples above)
  - Develop protocols / methods for processing people's geo-experience
  - Require all 'educators' & society actors to learn the rudiments of experiential learning

Slide 6

New journal

How to share? know? disseminate?

New journal

- *Journal of Environment, Experience, Learning*
  - *JEEL*

- *Journal of Environment, Experience, Ethics, Learning*
  - *JEEEL, 3EL, tripple E L*

- *Journal of Geoethics, Experience, Learning*
  - *JGEL*

Article (paper) ideas

- "Citizen experience of the Nepalese earthquake and how we learned from it"
  - by a small group of (a) citizens who actually lived through the earthquake, and of (b) geomorphologists and geoethicists.

- "Adapting to a new life after Typhoon Haiyan (Yolanda): Ethical and practical Lesson for others"
  - by villagers and scientists.

- "Comparing climate change models: Using critical review techniques for more reliable interpretation"
  - by climate change modellers

- "Companion modelling: How to help communities help themselves"
  - by experts in role-play, agent-based modelling and local stakeholders

- "Translating environmental internship experience into transferable learning"
  - by a group of students shortly after the end of their internship

---

- Communicating about water resource issues: A system dynamics-based gaming approach
  - by a group of citizens, elected officials & water management educators

- A game to explore the influence of managerial myopia in mismanaging renewable resources
  - already published??

- Review of experiential learning methods in geoethics and sustainability
 - by educators & students

---

- How the variety of participant experiences at COP21 resulted in learning and an agreement
  - by attendees, negociators & …

- People's experience of climate change in reality and in a simulation: Issues of fidelity and validity
  - by …

- Lived experience of negotiations on land rights: What methods for what results?

- Ethical dimensions of NGOs experiences with resilience: What and how can they learn from each other?

Goals of new journal

- Level 1 ➔
  - Share best practice, knowledge & research
    - On experiential learning for geoethics
    - On how we learn from geo-experience
      - = Similar to most journals
- Level 2 (higher / deeper / meta) ➔
  - Increase the use & effectiveness of environmental experience for geoethical learning
  - Reinforce geoethical learning: Goal = it becomes
    - the central thread in all edu programmes
    - a part of every commercial activity
    - a real & prominent concern in all orgs
    - a condition for all political activity & policy decisions
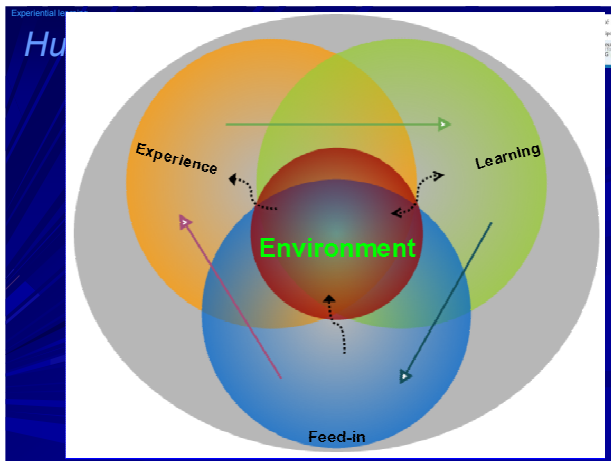
Hu... [Human]

Experience — Learning — Environment — Feed-in

Final thoughts

- I welcome expressions of interest in the journal
  - eb brd, author, volunteer, copy ed, reviewer, advisor, fund raiser, disseminator, etc

- We have an **ethical obligation** – to: science, ourselves, the earth and our offspring (future generations) – to help the planet's passengers **learn** about geoethics and create a **culture** of geoethical caring.
- Humanity urgently needs to learn how to navigate their own safety on spaceship earth.
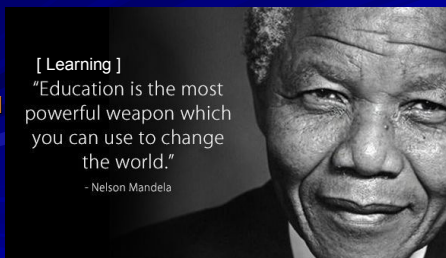
For edu, read learning

Human history becomes more and more a race between education [learning] and catastrophe.
H.G. Wells, *The Outline of History*

Learning is experience. Everything else is just information.
-- Albert Einstein

[Learning]
"Education is the most powerful weapon which you can use to change the world."
- Nelson Mandela

Thank you

crookall.consulting
or   journal.eeld
@
gmail.com

Danke – DE
Gracias – ES
Merci – FR
Ευχαριστώ – GR
Sukria – IN
Grazie – IT
Arigato – JP
Terima kasih – MY
Spasibo – RU
Khop khun – TH
Ta – UK
etc

end / fin