

# Ecosystem Approach and Radiation Protection

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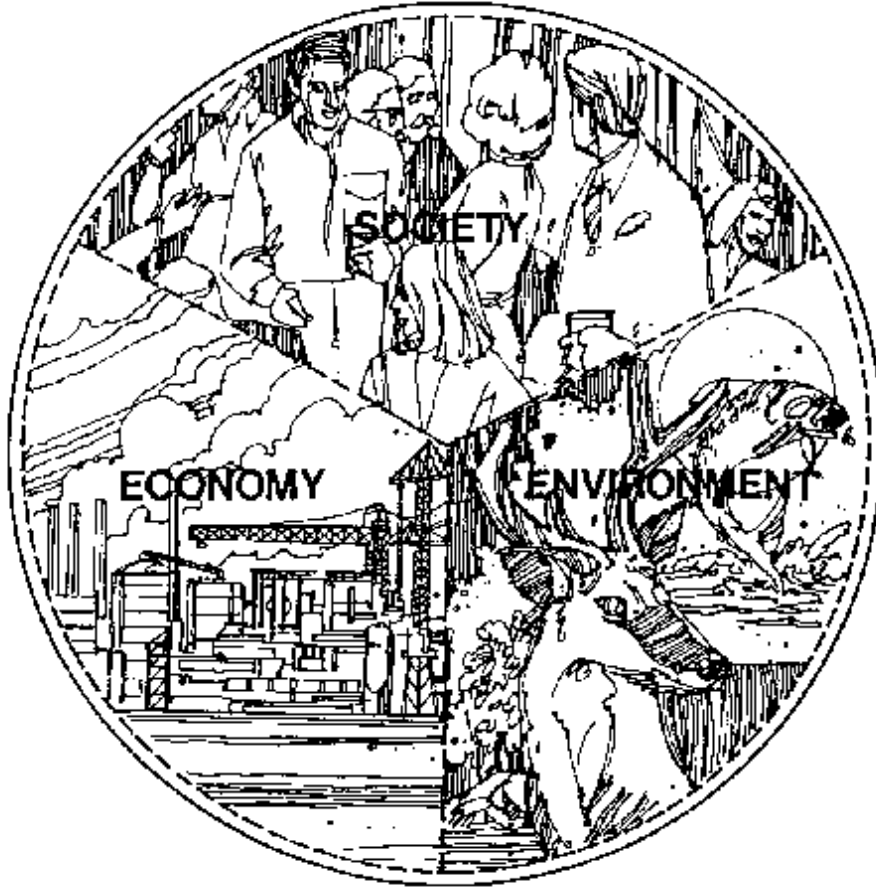
**Centre for Environmental Radioactivity (CERAD)**  
**ICRP Committee 4: TG94 Ethics**

## ICRP TG94: The Ethical Foundation of Radiological Protection

- Historical Context
- Principle-based ethics – this is what ICRP framework represents
- Ethical theories – Short section
- Common Values – The main area of elaboration
- Applications/Implementation in areas
  - Biomedical
  - Environmental Health and Society
  - Nuclear Safety and Workers
  - Ecological Aspects
- Case studies (and challenges)

Professional Ethics - Radiation Protection Community  
Societal and Political Context

# Ecosystem Approach: Societal – Environment – Economic Interactions



Hartig and Valentine 1989



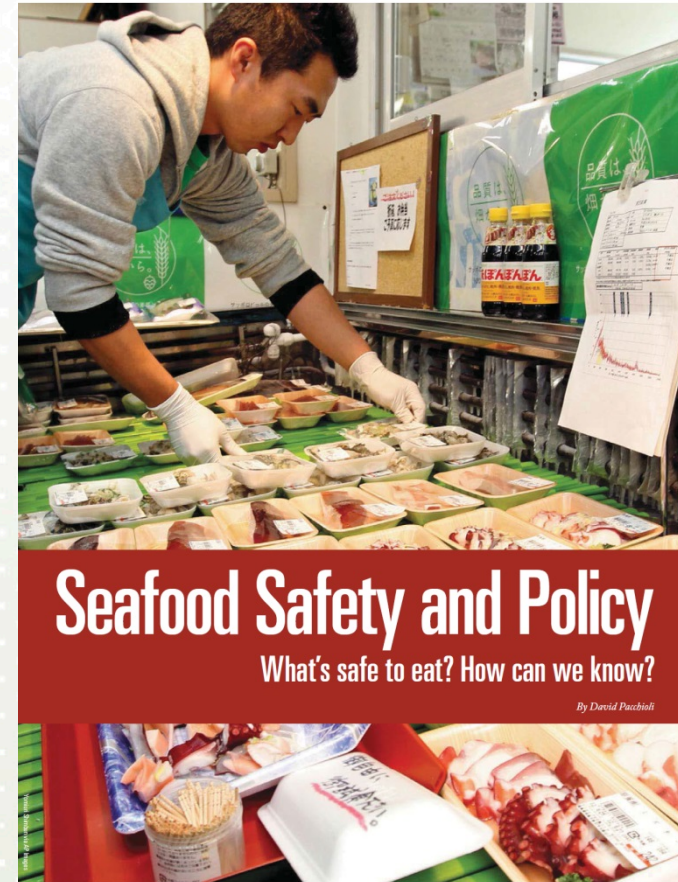
*What is the economic cost of marine contamination after Fukushima??*

Shunsuke Managi,  
Tohoku University

<http://www.whoj.edu/website/fukushima-symposium/overview>

## Cost of Marine Contamination after Fukushima

- Direct loss from sales
- Decrease in market value of marine products – even non-contaminated
- Savings from government subsidies
- Ecological impacts of fishing bans
- Societal and demographic consequences from loss of livelihood for fishermen



Oceanus, 2013

# Chornobyl: Red Forest



[www.chornobyl.in.ua](http://www.chornobyl.in.ua)

# What is Harm? (Slide courtesy of Tom Hinton)

## Wildlife defies Chernobyl radiation

By Stephen Mulvey  
BBC News

« It contains some of the most contaminated land in the world, yet it has become a haven for wildlife - a nature reserve in all but name. »

*20 April 2006*



## Chernobyl 'not a wildlife haven'

By Mark Kinver  
Science and nature reporter BBC News

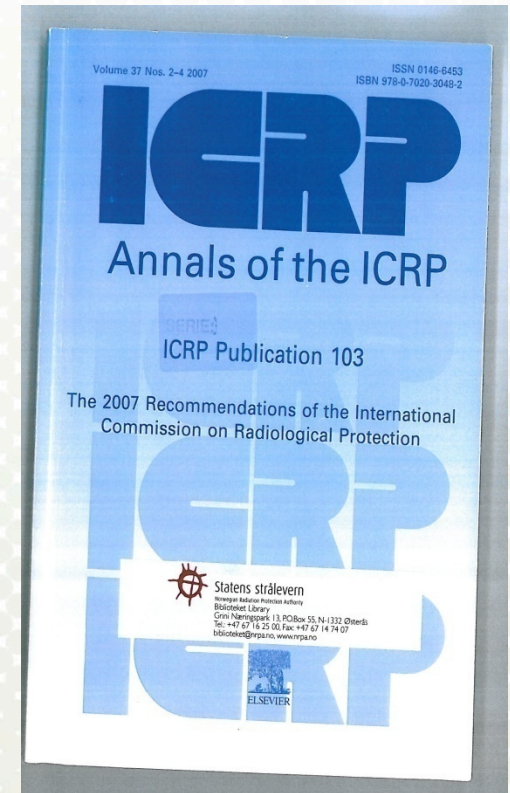
« The idea that the exclusion zone around the Chernobyl nuclear power plant has created a wildlife haven is not scientifically justified, a study says. »

*14 August 2007*



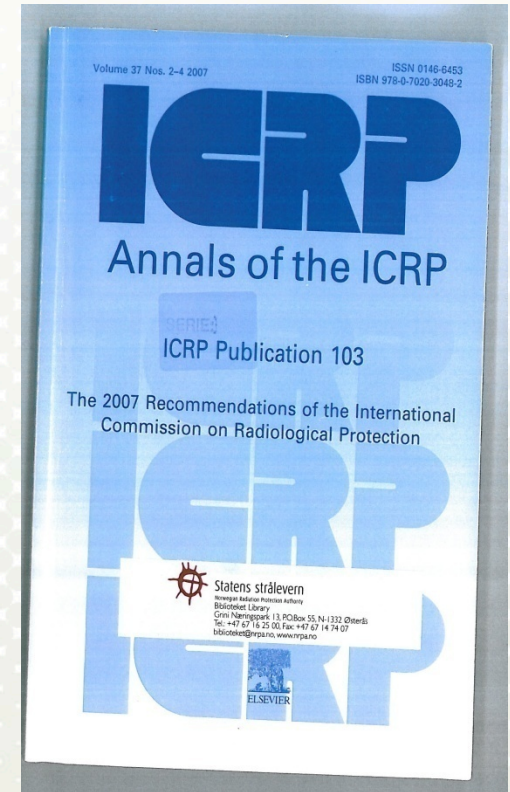
# Radiation Protection ...

*“If man is adequately protected then other living things are also likely to be sufficiently protected” [ICRP, 1977],*



# Radiation Protection ...

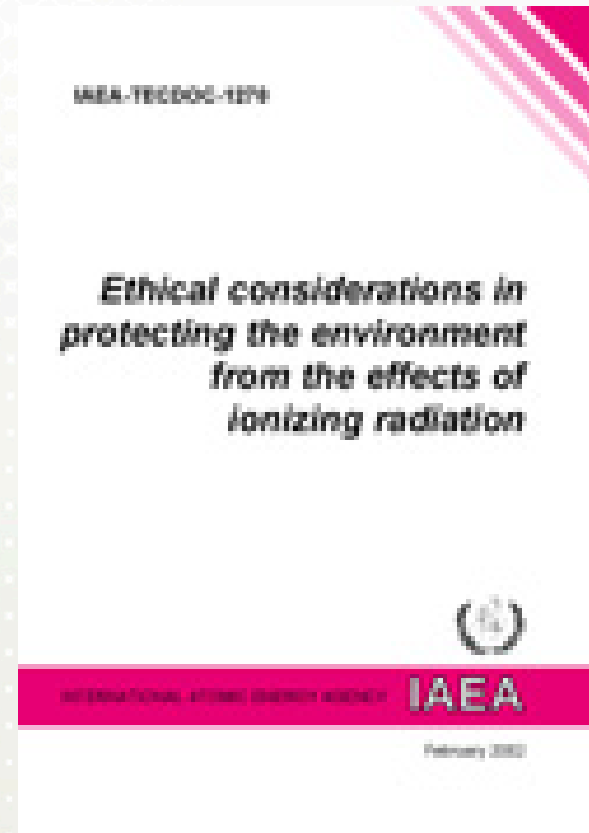
*“The Commission believes that the standard of environmental control needed to protect man to the degree currently though desirable will ensure that other species are not put at risk. Occasionally, individual members of non-human species might be harmed, but not to the extent of endangering whole species or creating imbalance between species. At the present time, the Commission concerns itself with mankind’s environment only....” [ICRP, 1991],*





# Background: Towards a Framework for Radiological Protection of Non-Human Species

- ◆◆◆
- ◆ Papers from Pentreath and Woodhead (1998- )
- ◆ Report from International Union of Radioecologists (IUR) 2000
- ◆ IAEA Report on ethical considerations (2003)
- ◆ Issues:
  - ◆ Situations where humans are absent (e.g., disposal)
  - ◆ Not compatible with management of other environmental stressors
  - ◆ Needs to be demonstrated



EU 6th-7th Framework Project s: FASSET, ERICA, PROTECT, STAR  
[www.ERICA-project.org](http://www.ERICA-project.org) ; [www.star-radioecology.org](http://www.star-radioecology.org)

# ICRP « Reference Animals and Plants » - RAPs

...

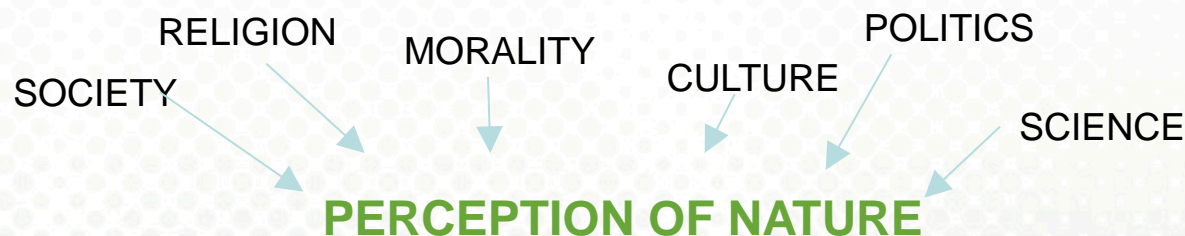
- Deer
- Rat
- Bee
- Earthworm
- Pine tree
- Grass

- Duck
- Frog
- Trout

- Flat fish
- Crab
- Macroalga

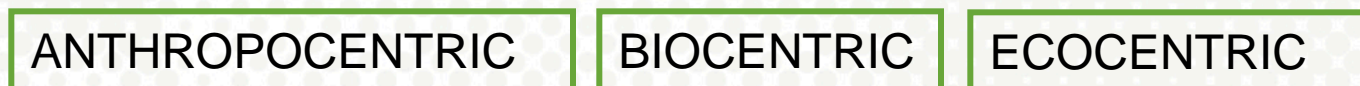
- Typical, accessible, documented, various sizes and life cycles, measurable dose-effect
- Generic virtual entities to serve as points of comparison to assess exposure and effects
- Can contribute to assessment of ecosystem effects, but not sufficient

# Ethical Considerations in Protecting the Environment from the effects of Ionising Radiation (IAEA, 2003)



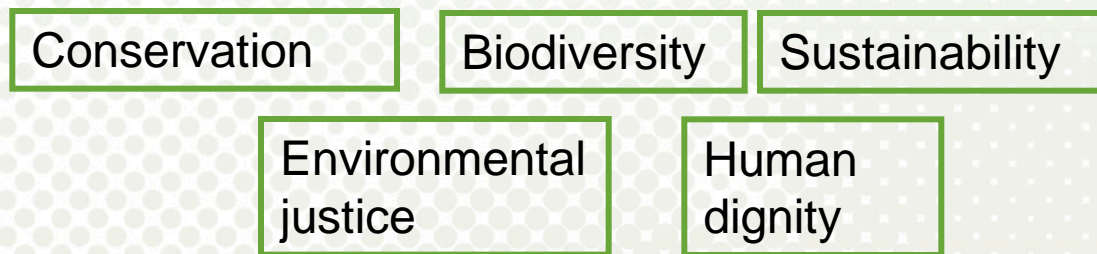
*Value-basis*

Conceptualised as:



*Philosophical worldviews*

Broadly compatible with the principles of:



*Primary Principles of Environmental Protection*

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Precautionary Principle  
ALARA                      Polluter Pays

Best Available Technology  
Stakeholder Involvement

*2nd Level management principles*

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## Overview

- History of Environmental Ethics
- Ethical Considerations in Protecting the Environment...
- Perception of Nature
- Theories of Environmental Ethics
- Relevance to the fundamental ethical framework for radiation protection



Children's drawing of scientists (Sjoberg, S. 2005: [www.uio.no/svein-sjoberg](http://www.uio.no/svein-sjoberg))

# Ecological Ethics



Conceptualised as:

ANTHROPOCENTRIC

BIOCENTRIC

ECOCENTRIC

*Philosophical worldviews*

Broadly compatible with the principles of:

Conservation

Biodiversity

Sustainability

Environmental justice

Human dignity

*Primary Principles of Environmental Protection*

Precautionary Principle  
ALARA  
Polluter Pays

Best Available Technology  
Stakeholder Involvement

*2nd Level management principles*

# History: Environmental Philosophy and Ethics

- Nature (animals and the environment) and man's relation to it is a central concept in many religions and worldviews
- In Western philosophy, the issue has been addressed since Greeks; for many centuries the dominant view was that of Christian theology
- UK Cruelty to Animals Act (1876)
- 1962 *Silent Spring*, Rachel Carson
- Increased interest in animal welfare, environmental politics and philosophy in the 1970'-1980's (USA and Europe)
- Strong links to developments in science
  - evolution theory, ecology, biology, genetics, animal sentience



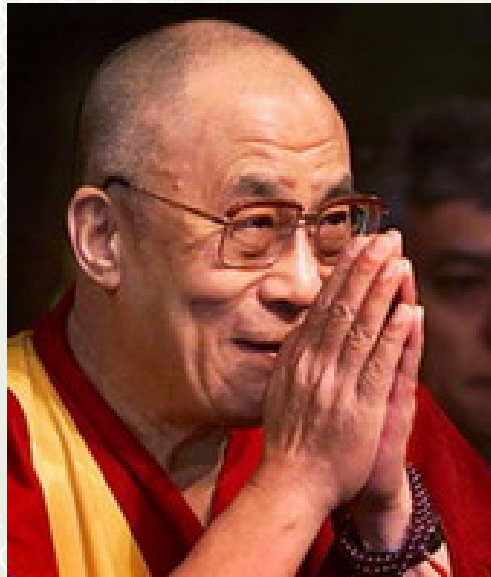
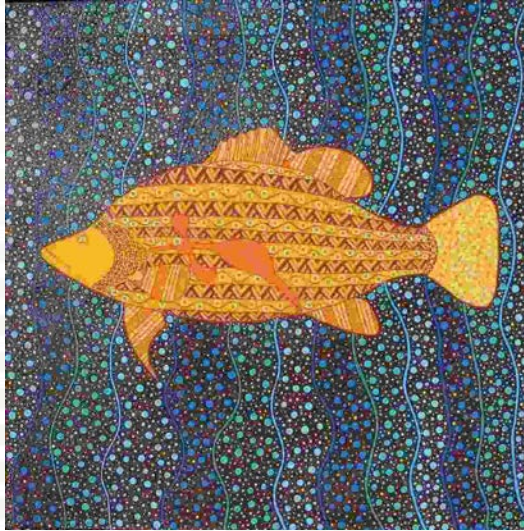
## Western Christianity

- Christian-Jewish religion has been cited as the source of modern ecological destruction
  - Let us make man in our image, after our likeness: and let them have dominion over all the fish of the sea and over the fowl of the air, and over the cattle, and over all the earth, and over every creeping thing that creepth upon the earth (Genesis 1:26-30)



White, *Science*, 1967

# Non-Western Ideas





# Other influences on human perceptions of nature (Arriansen, 1996)

- Technological Development (Man's triumph over nature)
- Commerce, trade and capitalism (exploitation of nature's resources)
- Age of Enlightenment
  - Reductionism in Science
  - Animal sentience, genetics, ecology, ...



Charles Darwin, 1840 (Downe House, Downe, Kent, Great Britain/Art Resource, NY)



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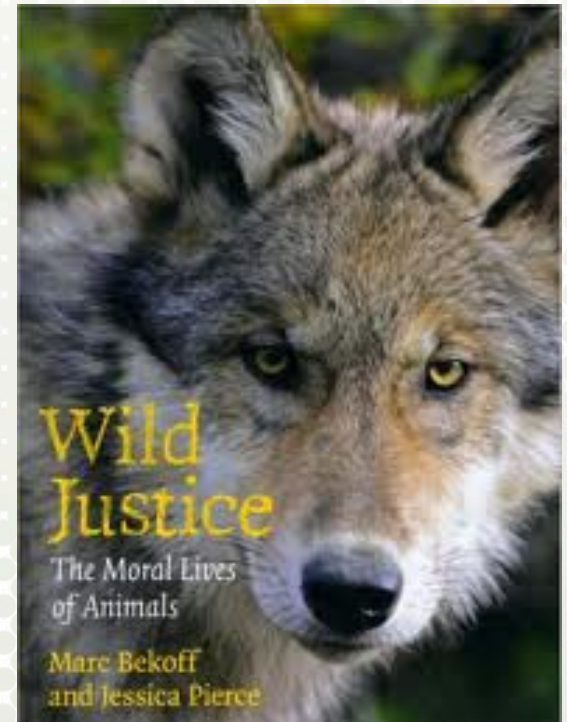
Precautionary Principle  
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## Anthropocentrism

- Non-human species and the environment have value only in so much as they satisfy human interests – “extrinsic value” (Frankena, Bookchin)
- Humans are the only entities that have moral standing
- Environmental effects matter only to the extent that they affect human interests
- Humans are the only “valuers”



# Valuing the Environment?



Rondane National Park, Norway

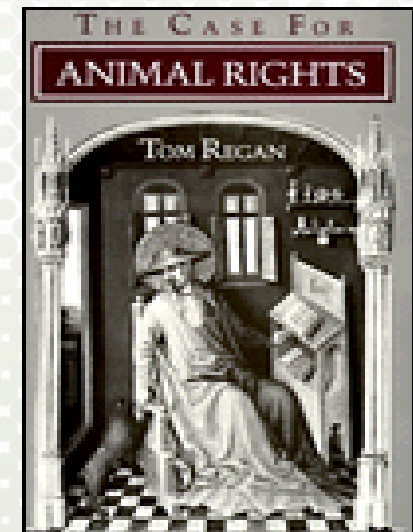
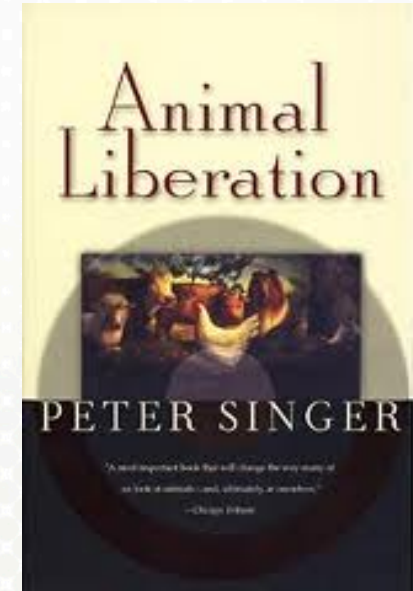
## Bentham's question (1789)

"The day may come when the rest of the animal creation may acquire those rights which never could have been withholden from them but by the hand of tyranny. The French have already discovered that the blackness of the skin is no reason why a human being should be abandoned without redress to the caprice of a tormentor. It may one day come to be recognized that the number of the legs, the villosity of the skin, or the termination of the os sacrum, are reasons equally insufficient for abandoning a sensitive being to the same fate. What else is it that should trace the insuperable line? Is it the faculty of reason, or perhaps the faculty of discourse? But a full-grown horse or dog is beyond comparison a more rational, as well as a more conversable animal, than an infant of a day, or a week, or even a month, old. But suppose they were otherwise, what would it avail? The question is not, Can they *reason*? nor, Can they *talk*? but, Can they *suffer*?"



## Biocentrism (Animal Ethics)

- Utilitarian (Peter Singer)
  - Ethical realm concerns all sentient creatures "can they feel pain, do they suffer"
- Kantian/deontological (Tom Regan)
  - animal rights, duty based ethics. Animals are capable of experience, thus have similar claim to rights as humans



# Biocentrism

- All biocentrics claim that individual non-human organisms can have moral standing
- Disagree on the basis by which we draw a moral distinction between humans and animals?
  - Rationality
  - Sentience
  - Inherent or instrumental worth
- Disagree on which organisms have moral standing



## Case: GloFish®

- GloFish are genetically modified fish that glow under ultraviolet light
- They were originally created for use in ecotoxicological studies, but are now marketed commercially in the US.
- Should they be permitted to be sold in the EU?

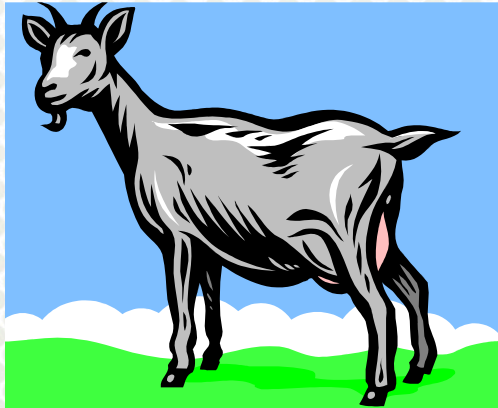




**Leave the flowers  
for others to  
enjoy!**



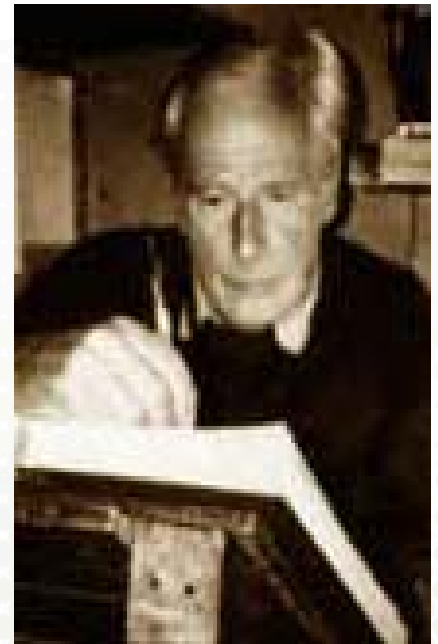
**Let the  
flowers live!**



**The introduction of goats on an island  
is threatening a rare flower. There is  
nowhere to move the goats. Should  
they be exterminated?**

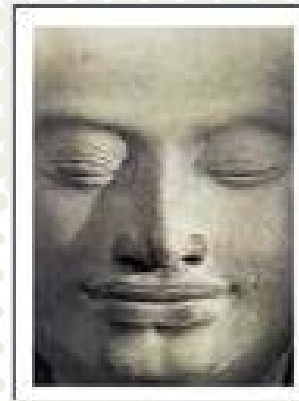
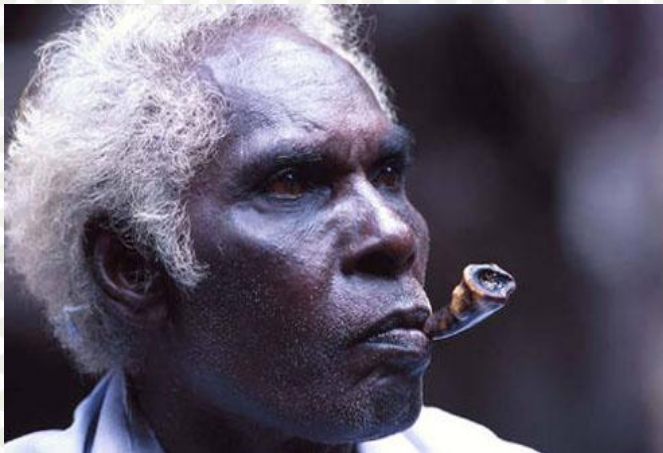
## Ecocentrism

- Ecosystems and/or their components have intrinsic or inherent value - "value in themselves" (Callicott, Holmes-Rolston III)
- *A thing is right when it tends to preserve the integrity, stability and beauty of the biotic community; it is wrong when it tends otherwise, Leopold*
- Humans have no right to interfere with the richness and diversity of the ecosystem except to satisfy vital needs (Næss)
- Proponents of ecocentrism claim that both biotic and abiotic components of the ecosystem can have moral standing - "holistic"
- Disagree on the reasons for and solutions to environmental problems (human arrogance, male dominance, social and economic hierarchy)



## Summary (at the time of the IAEA publication)

- All three theories can support the need to protect the environment
- Anthropocentrism can give powerful grounds for addressing the environmental impacts of ionising radiation
- Biocentric and ecocentric views reflected in many religions and cultures
- Need to recognise and preserve diversity

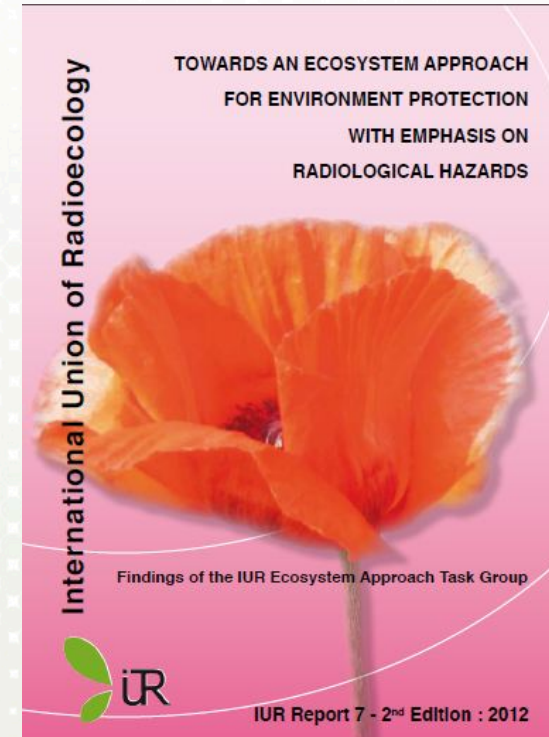


## ... Ecosystem Approach

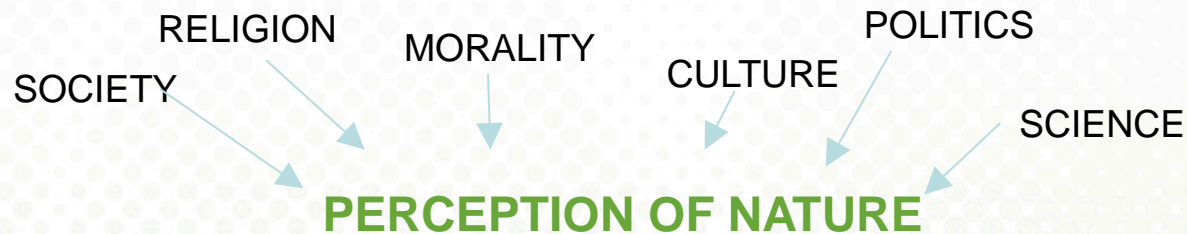
- A holistic approach to environmental protection
- Recognise the complex interaction between society and the environment
- Recognise the complex interactions within ecosystems

### Ethical Considerations

- All other things being equal, ionising radiation should not be treated differently to other environmental stressors
- Exploring the ethical foundations of environmental protection

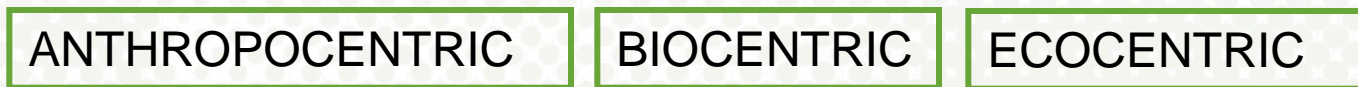


# Ecosystem Approach



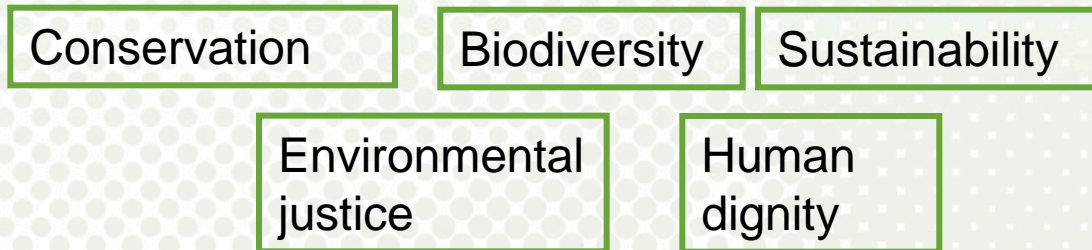
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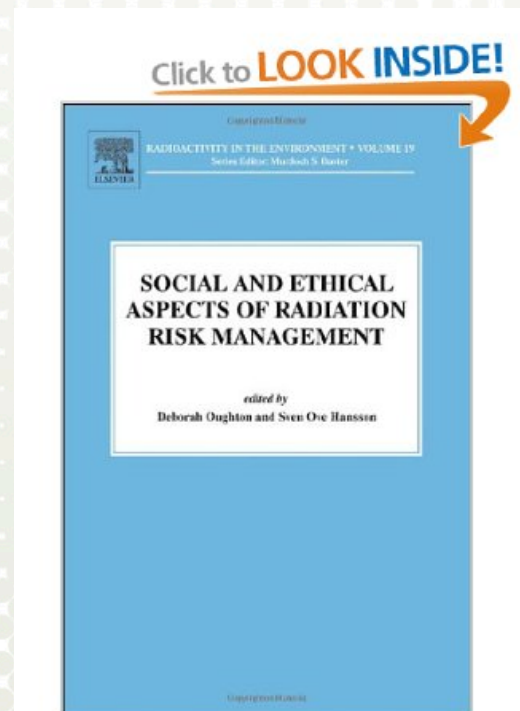
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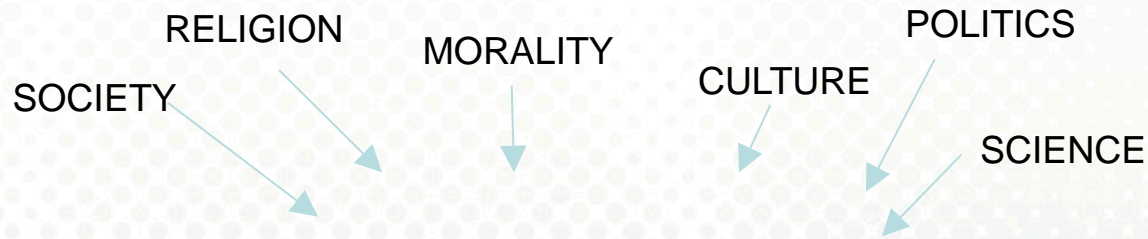
*2nd Level management principles*

## TG94: The Ethical Foundation of Radiological Protection

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  - Ecological Aspects
- Case studies (and challenges)



# Principles of Biomedical Ethics



*Value-basis*

Conceptualised as:



*Ethical Theories*

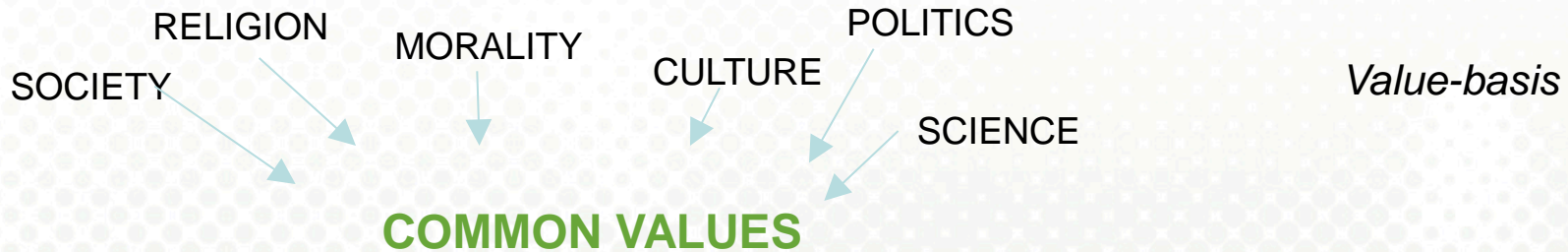
Broadly compatible with the principles of:



*Biomedical Principles*



# Radiological Protection – Principle-Based Ethics



DIGNITY/RESPECT   JUSTICE   WELL BEING   COMMUNITY VALUES   ++

Conceptualised as:

UTILITARIANISM   DEONTOLOGY   VITRUE ETHICS   ++   *Ethical Theories*

Broadly compatible with the **principles** of:

Justifcation   Optimisation   Dose Limits   *Protection Principles*



## Literature

- Singer, P. 1981. Animal liberation and animal rights
- See also: <http://www.utilitarian.net/singer/by/1979----.htm>
- Oughton, D.H. 2003. Protection of the Environment, *J. Environ Radioact.*
  - IAEA 2002. Ethical considerations in protecting the environment from the effects of ionizing radiation . IAEA-TECDOC-1270
  - Oughton and Howard 2012. The Social and Ethical Challenges of Radiation Risk Management, *Ethics, Policy and Environment*,
  - Arriansen, P. 1996. Milføilosofi.
  - Shunsuke Managi, The Economic Consequences of Chernobyl. Fukushima Oceans Conference Tokyo Nov 2012. Presentation available from: [www.whoj.edu/website/fukushima-symposium/overview](http://www.whoj.edu/website/fukushima-symposium/overview)

# Thank you!

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