

Scottish Earth Science Education Forum:



A Science Education Support Infrastructure

The First Five Years 2001-2006

www.scottishgeology.com/SESEF

The issues of the day...



- Many of the issues facing societies are underpinned by a knowledge of how the Earth system works...
 - use of resources
 - availability of energy
 - nuclear waste management
 - climate change
 - earthquake and volcanic hazard
 - flooding & landslips
 - availability of water
 - deforestation
 - desertification
- each affects the quality and viability of life and is of concern to societies

Understanding How the Earth System works

Knowledge and understanding of how the Earth system works:

- should be an essential part of every young person's education.
- informs public debate and opinion about the sustainability of Earth resources and environments
- contributes to delivery of a scientifically literate electorate
- produces professional earth scientists needed to support and manage Scotland's environment and natural resources
- raises awareness and promotes appreciation of Scotland's natural heritage, landscape and geodiversity



A Science Strategy for Scotland Report



“Ensure that enough people study science to a standard which will enable the future needs of the country to be met”

“Secure very high levels of achievement by those specialising in science”

“Ensure that all learners acquire the capacity to cope as citizens and decision makers when dealing with scientific issues”

“Encourage and build on natural curiosity and excitement about science”

Challenges for Science education in Scotland



- the lack of **confidence** among teachers (particularly at 5-14 level)
- the difficulty in maintaining **teacher knowledge**, materials and curricula in rapidly advancing areas of knowledge
- the difficulty of **access** to either science centres or continuing professional development in Scotland's **remote areas**
- the perceived **dullness and irrelevance** of science amongst students
- The **decline in undergraduate science numbers** and scientific literacy, implying future shortages of trained professionals.

...and specific challenges for the Earth Sciences

- UK oil industry needs to replace ~40% of geoscience staff in 8-10 years
- only ~25 schools teach Higher Still Geology
- only ~70 candidates per year for Higher Geology
- the small and ageing Geology teacher community
- not possible to train as an Earth Science teacher
- low % of Scots studying Earth and related sciences at some Scottish HEI's
- The decline in undergraduate science numbers and scientific literacy, implying future shortages of trained professionals.
- Need for a modern, holistic Earth Science curriculum



Employment opportunities in the Earth sciences



- Oil and gas industry
- Minerals, metals (extractive industries)
- Water (hydrogeology)
- Engineering
- Waste, remediation, environmental monitoring, sequestration (e.g. CO₂)
- Geophysics

What is SESEF?

- A facilitator
- A national grassroots network of Earth Science educators
- A collection of earth science education projects
- A collection of partnerships
- A full time Development Officer
- 12 Scottish facilitators (delivering CPD workshops for teachers across Scotland)
- A Steering Committee, a Management Group and the Earth Sciences Trust
- A lot of people with a little time and goodwill



What is SESEF?



- **~300 members representing:**
schools and colleges, universities (science + education), public institutions (e.g. British Geological Survey, SNH), museums (e.g. National Museum of Scotland, Hunterian Museum), science centres (e.g. Our Dynamic Earth, Glasgow Science Centre), LEA's, countryside rangers, professional societies, industry.
- **Discipline areas of Earth Sciences:**
geology, geophysics, physical geography, meteorology, astronomy, oceanography, environment and resources
(Understanding the Planet)

What is SESEF?

Aims & Objectives:

- develop networks and partnerships with (and between) schools, universities and other educators and stakeholders
- develop innovative Continuing Professional Development with and for teachers
- develop access to the best earth science resources for schools
- advocate and contribute expertise to curriculum change (A Curriculum for Excellence)
- provide learning beyond school boundaries



5-14 Curriculum: Environmental Studies



Cross-cuts traditional discipline boundaries
(basic sciences not mentioned by name!)

- **Science content includes:**
 - **Earth and Space (Earth in space, Materials from Earth, Changing materials)**
 - **Physical Environment (atmosphere and surface, weather and climate, landscapes)**
 - **Energy and Forces**
 - **Living Things and the Processes of Life**

What is SESEF doing now?



Continuing Professional Development (CPD) for 5-14 Environmental Studies

“Earth Materials” and “Earth Structure” with Earth Science Education Unit (England) (UKOOA funded)

“Landscape and Weather” (Royal Meteorological Society, Edinburgh District, SESEF funded)

“Earth in Space” with Royal Observatory, Edinburgh (PPARC)

- All being rolled out across Scotland's 32 LEA's

What is SESEF doing now?

Secondary Teachers and Higher Still curricula

- Secondary teacher support by visits to schools (Petroleum Exploration Society of Great Britain)
- Develop new projects and initiatives to support teachers in the Scottish secondary curriculum (Higher Still) - to be funded by Earth Sciences Trust?





Earth Sciences Trust

Established 2006

Chairman: Stuart Monro

Secretary: Dr Alan Parsley

Support for Earth Sciences Teaching in Secondary Schools



Proposed initiatives:

- Study and Debate Projects in Schools
- Celebrity Earth Sciences Lectures
- Summer Schools
- e-learning in the Earth Sciences (UoE)
- Interdisciplinary science workshops
- Outdoor education

What is SESEF doing now?



Engaging with "A Curriculum for Excellence" Science Curriculum review

- Position paper (2005)

Relevance to real world - implications for science disciplines?

Cross-curricular activities (values; citizenship; debate)

- Earth science learning outcomes ("I can..in order to..")

- Response to Science Rationale

the big ideas - real life contexts?

retention of the biology, physics, chemistry framework? - business as usual?

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-(www.scottishgeology.com/SESEF)

Building Regional Support Structures



- Create partnerships for teacher support
- ASESI - Alliance of Scottish Earth Science Institutes
(incl. HEI Earth Science departments, BGS)
- Train postgraduates/undergraduates as science communicators (transferable skills programmes)
- Provide co-ordination/leadership in each HEI
- Build links with local/regional schools
- Use HEI's and related facilities for outreach workshops for secondary school classes and teachers

How is SESEF funded?

- Scottish Natural Heritage, UK Offshore Operators Association (UKOOA)

supporting core costs, development officer, and facilitators

- Edinburgh and Glasgow Geological Societies, Nationwide Building Society and BGS (resources)

- University of Edinburgh (host institution, support in kind)

- Project funds from: PESGB, PPARC, SEED, SNH



SESEF: Some Outcomes

- Unpredictable outcomes and opportunities emerge from networks and partnerships
- Members and potential partners are engaged by wider possibilities created by network and co-ordination
- Harness small amounts of goodwill and support from large numbers of people
- Limited resources are deployed more effectively
- Outcomes and achievements have potential application in other science disciplines

