BGCI's U.K. Symposium on Plant Conservation Education

May 18 - 19, 2006
Royal Botanic Gardens, Edinburgh

BGCI
Plants for the Planet

Format

- Meeting held in Edinburgh Botanic Gardens May 18th and 19th 2006
- 23 people attending – high proportion from UK botanic garden education field, however several participants from Higher and Further Education; few from non-bg based organisations
- Series of 'mini presentations' followed by discussion groups and plenary sessions

Presentations

- Brief overview of 'Education and biodiversity' in schools in England
- Plants in the Scottish Curriculum
- Plant science / Biodiversity in Higher Education (x 2 / Scotland)
- Case study of non-formal education (Eden)
- Oxford BG – case study on integration of T14 in education activities
- Community education - case study
- A school perspective on integrating plant science

Issues

- Corporate sector not engaged
- Lack of emphasis on life long learning
- Big gaps in 'plant biodiversity' in science curriculum from age c12-16 – mostly cellular/molecular biology etc – not whole organism / habitat
- Higher Education offerings good – but not many courses available and few students entering field
- Schoolchildren have little opportunity for field study / outdoor experiences (several reasons for this)/ and many 'visits' are only short term
- Physical access to 'green spaces' in general
- Little real evaluation of 'learning'
- General loss of connection to 'nature'
- Language (e.g. the word biodiversity)
- Science still seen as 'elitist' – environmental 'learning (in schools) mostly accessed through geography / citizenship – and consequently not always assessed/ compulsory
- Still has a 'negative' association – too big a problem / 'I can't do anything as an individual'
- People can't always 'see' the problem – not enough concrete evidence – often importance not understood
- Communication between key organisations poor – not enough joined up thinking and lack of clarity on messages

Potential for development

- Community education
- 'In depth' learning provision – multiple visit programmes etc/ smaller groups for longer time
- Teacher training to bridge 'teenage' gap
- Teacher training across broader range of curriculum disciplines
- Adult education / lifelong learning programmes
- Concerted policy and lobbying effort

Recommended Actions

- Initiate correspondence with list of other key organisations working in this field e.g. Natural England, RSPB, Groundwork, Scouts etc.
- Develop good 'partnerships' to deliver targets
- Explore good 'drivers' that will encourage positive response
- Make things 'concrete' / use 'supply links' etc
- Work more effectively within current useful initiatives e.g. Outdoor Manifesto for schools, Breathing Places and Real World learning campaigns for volunteers and informal 'learners'.
- Try to set programmes within a known context for participants e.g. climate change or UN Millennium Goals
- Multi-directional approach – bottom up as well as top down
- Develop a communications strategy
- Develop specific targets for different audiences / programme levels
- Find a 'Target 14' champion &/or bring on board a group of 5-6 politicians (cross party) to lobby on our behalf
- Work more effectively with media
- Find a consistent 'brand' or strap-line all deliverers can use
- Develop range of 'consistent' messages

Actions for specific audiences

Schools

- More 'in depth' programmes with schools
- Provide 'inspirational' teacher training and CPD
- Use creative 'ways in' e.g. through 'food', every child matters programme, citizenship etc
- Develop outreach teaching materials
- Develop partnership programmes with schools
- Feed into current initiatives e.g. applied science GCSE, vocational GCSEs
- Get the kids outside 'doing'
- Presentations at school conferences e.g. NUT, School governors - or to exam boards etc

Higher / Further education

- Extend and expand provision at higher level
- OU to perhaps create a course for general public on biodiversity
- Encourage better feed back loops from graduates into schools to encourage take-up

Current situation in Formal Education

Biodiversity and schools: an overview
Gail Bromley MBE FL, Royal Botanic Gardens, Kew
Biodiversity – where is it in the curriculum?

Occurs, in part, in
- Science
- Geography
- Citizenship

…….. Mostly!
We have the potential to reach 8,774,103 children – via these subjects – from 3-16yrs i.e. KS 1-4 inc.

We can also deliver within other subject areas – a fact well exploited by Botanic Gardens (and others) across a range of disciplines

Science at Key stages 1 & 2
Themes include Scientific enquiry/ Life processes and living things / Materials & their properties / Physical processes
Key units include:
- Growing plants
- Plants and animals in the local environment
- Variation
- Helping plants grow well
- Habitats
- Enquiry in env'tl and technological contexts
- Life cycles
- Interdependence and adaptation
- Micro-organisms

Science at Key Stage 3
- Cells
- Reproduction
- Environment and feeding relationships *
- Variation and classification*
- Ecological relationships*
- Plants for food*
- Plants and photosynthesis

Science at Key Stage 4 (2008)
- Cells and their characteristics
- Dissolved substances and their movement in cells
- Photosynthesis
- Biomass and food chains

- Micro-organisms and 'waste'
- Enzymes
- Keeping our body functions 'constant' and regulated
- Human inheritance

Science (Biology) and KS 5

- Man and his Environment?
  - Biodiversity
  - Conservation
  - Succession
  - Speciation
- Salters – environment / climate change
- Germination / adaptation
- Several opportunities for Biotechnology
  - Salters, OCR, AQA , Edexcel

One area that may not be explicit but which can
be used is …….

- 2.1 Scientific enquiry
  - **Ideas and evidence in science**
  - **Investigative skills**
  - **Obtaining and presenting evidence**
  - **Considering evidence and evaluating**
  - **Breadth of study**

  However it is not always obvious that these can be linked!

Scientific enquiry and plants

Plant science in NC @ KS 2 requires 'scientific enquiry' to be taught through:

Life processes - including

Green plants
Reproduction
Variation and classification
Feeding relationships
Micro-organisms

Some new research!!

Univ. Warwick and Wellcome Trust report
(www.wellcome.ac.uk/education/lifestudy)

- A level students and their teachers rated living organisms, food and plant biology as important ……. However – ecology was rated as least interesting and……..on the whole all of the above were rated as the 'least interesting' aspects of biology
- Unfortunately encourages the underlying shift from whole organism to molecular or cellular biology
- Lack of field work and classification work
- 41% of A level students can at best name 1 wild flower (from selection of 10 common ones)
- Trainee teachers (36%)

Source SAPS

Geography curriculum at Key stages 1/2
Units from schemes of work

- Improving the environment
- How can we improve the area we see from our window (Jeannie Baker)?

Can come briefly into other units e.g. coastal
environments, mountain environments

Geography at Key Stage 3/4

- Investigating Brazil
- Can the earth cope? Ecosystems, population and resources*
- Local action, global effects*

Geography and Key stage 5

- AQA – Environmental education (syllabus B)
- OCR – No direct reference in either syllabus but comes 'into' physical systems and their management.
- Edexcel A – Ecosystems
- Edexcel B – Introducing biomes
- WJEC – Whole unit on 'Sustainable development'

Citizenship

- KS 1 & 2 – developing our school grounds
- Key Stage 3
    - Debating a global issue (rainforest)
    - Developing your school grounds
    - People and the environment
- Key stage 4 – Global issues – local action

Citizenship Curriculum – and biodiversity

- **Enquiry 4 'Achieving Sustainable Development I'.-** Enquiry consists of elements on a) Biodiversity and conservation. b) Recycling. c) Reducing the problem of Acid Rain + extension material (I yr KS 3)

- **Citizenship KS3 Scheme of Work - Unit 21: People and the environment-** Pupils investigate the complexity of evaluating choices by considering values and scientific evidence together.

- 'Sustainability' – as a broad theme – occurs at other stages

New Opportunities

- Every Child Matters
- Real world learning campaign
- Outdoor classroom manifesto
- Developing governors
- Teacher's TV
- Breathing Places (BBC)
- Possible RHS / NCCPG campaign 'Save it ; grow it'

The new manifesto!

- House of Commons Education and Skills Committee; Education outside the classroom, second report (2004-2005) "outdoor education is in decline… provision by schools is extremely patchy…neither the DfES or local authorities have done enough to publicise the benefits of education outside the classroom or to provide strategic leadership or direction in this area"
- More positively -the committee declared "We are convinced that out-of-classroom education enriches the curriculum and can improve educational attainment"

New Initiatives

The Manifesto sees students visiting various sites including city farms, allotments, country estates, parks and gardens. Activities linked to other DfES initiatives:

- Excellence and Enjoyment: a strategy for primary schools. Empowering primary schools to take control of curriculum, be more innovative and develop their own character."
- Every Child Matters - encouraging a healthy lifestyle, enriching and broadening learning experiences, helping to develop independence and the ability to make wise choices and promoting higher self esteem, self confidence and a positive approach to learning.
- The Healthy Living Blueprint for Schools- involves government agencies responsible for health, sport, the environment, rural activities and food standards in a drive to get young people "switched on" to a healthy lifestyle.
- London Challenge - extra support for schools with most challenging circumstances / lowest levels of achievement, enabling all London's pupils achieve their full potential.
- Cultural Offer for young people - helps realize the vision of Manifesto and offer opportunities for cultural learning outside the classroom.
- Self Evaluation for Schools (SEF). Ofsted will take this aspect of school life into account during inspections.
- Science Learning Centres - set up by the DfES & Wellcome Trust, for 'excellent' Continuing Professional Development (CPD) for those involved in science education

The issues in schools

- Many children still not selecting science after GCSE (although biology is high within selection)
- CPD still patchy and little emphasis on plants within it

- Poor career options offered vis a vis plant science / topics
- Science still a bit elitist?
- Slow progress in developing critical thinking skills?
- The need for the 'non-science' selection schoolchildren to still embrace our message
- Cost, litigation,H&S and timing issues for outside visits still need to be resolved more satisfactorily

Where should *we* focus 'biodiversity' learning in schools?

- Current discussion at Kew
- The need for good teaching about plants at higher level 'science' – career development for science and conservation?
- The 'primary' environment with 'empathy for nature' across the board
- Where can we have the greatest impact? – science? non science?
- Who should be doing what?
- What are the consistent 'values' and messages we should be promoting vis a vis plants?

Science Curriculum – a quote

"Science by itself will not be able to solve problems such as degradation of biodiversity. Public understanding of the issues involved is essential and people need to be motivated to take action. Science lessons out of doors can contribute if it is viewed as a cross curricular subject with many facets including the long-established science of objective scientific experimentation, the no less important field of ethical values and science in the everyday world beyond school."

Biodiversity education and botanic gardens: an overview

Gail Bromley MBE FLS, Royal Botanic Gardens, Kew

UK BGs /Arboreta etc offering educational programmes

- 61 botanic gardens / arboreta / reserves currently operating in the UK
  - 30 are registered with BGEN as offering education programmes

- Several other organisations offer a range of environmental education programmes
  - National Trust sites and private country houses
  - Zoos e.g. Chester, Marwell, Paignton, Jersey
  - Environmental trusts e.g. Woodland Trust, Charles Darwin Trust
  - Museums e.g. Natural History Museum, London

Range of education programmes

- Nearly all gardens offer an informal education / 'visitor' experience in the form of exhibitions, displays, brochures, trails, labels etc
- A large proportion of gardens / arboreta facilitate a visit by / actively engage with school

groups (66%), in particular primary
- A few gardens offer education for adults, community, FE or HE audiences (25%)

Types of education programmes available for schools in UK
- Teacher training / student teacher training
  - e.g. Kew, Chelsea, Eden, RHS, Edinburgh
- Guided tours
  - e.g. Glasgow, Westonbirt, Oxford
- Workshops
  - e.g. Eden, Kew, WP, RHS, Oxford, Edinburgh
- Trails
  - e.g.Edinburgh (Benmore), WP, Birmingham

Types of education programmes available for schools in UK
- Self use activity sheets
  - e.g.Birmingham, Kew, Bedgebury
- Project work
  - e.g. Kew, Hilliers
- Membership services e.g. newsletters etc
  - e.g. RHS, Ventnor, Wetlands
- Teacher placements
  - e.g. Kew, WP, Oxford, Eden

Top 14 'gardens/organisations' with assisted education at primary level

Total number of schoolchildren on **assisted** visits / Percentage of **primary** schoolchildren within this
- RBG Kew (41K / 55%)
- RHS (total for 4 Gardens) (10K / 95%)
- RBG Edinburgh (10K / 80%)
- Wakehurst Place (12K / 65%)
- Chelsea BG (2K / 98%)
- Eden (29K / 45%)
- Cambridge BG (2K / 95%)

Top 14 'gardens/organisations' with schools education at primary level
- Glasgow BG (2.5K / 95%)
- Bedgebury Arboretum (2.8K / 45%)
- National BG Wales (7K / 80%)
- Sir Harold Hilliers BG (12K / 90%)
- Westonbirt arboretum (14K / 75%)
- Oxford BG (4K / 45%)
- Birmingham (8K / 80%)

Topics
Naturally very dependent on site resources

- where tropical houses are present – adaptations / rainforest etc
- in arboreta – trees: their life cycles and uses
- where local reserves are accessible – local habitats and local biodiversity
- Where facilities exist on site (or at the school) – may be easier to develop more 'interactive' or 'investigative' activities for topics e.g. horticulture

Top Topics (plant theme; not curriculum)

- Rainforests (Kew, Birmingham, Edinburgh, Cambridge, Glasgow, Eden, Oxford)
- Adaptations (Kew, Birmingham, Chelsea)
- Everyday choices (sustainable devt.) (Wales, Eden)
- Plant explorers (Eden)
- Plants / seeds and their life cycles / botany (Wales, Bedgebury, Westonbirt, WP, RHS)
- Ecology / pond dipping / minibeasts/ pl&animal interactions (Cambridge, Bedgebury, WP, Hilliers)
- Trees (Scottish – Glasgow, Edinburgh; Global – Westonbirt)
- Growing plants / Helping plants grow well (Hilliers, Chelsea, RHS)

Others offered but not necessarily top for most

- Food
- Sustainable Devt. / fair trade
- Plant hunting
- Classification
- Art & Plants

Issues

- Botanic garden staff (and teachers) overstretched in UK
- Staff often not trained in educative practices and processes
- Very little evaluation of materials is done – quite a lot exists but no-one knows if it is any good!
- Very little research is done on 'what learning actually takes place'
- School visits are often short term (2-3 hour hits) and are not properly followed up

Report compiled by Gail Bromley, RBG Kew

For more information, see the website, www.bgci.org/education or www.plants2010.org