BGCI's China Symposium on Plant Conservation Education

April 19, 2006
Beijing Botanic Garden, China

BGCI
Plants for the Planet

1. List of participants: Name/Organisation/Role in Organisation/Address and email contact.

Refer to Appendix 1

2. What is the status of plant-based education in your country? List which stakeholder groups are implementing T14 and provide brief examples of what they are doing.

Although environmental education (EE) is at the initial stage of development, environmental awareness in China has grown significantly in the last 10 years. Within this period, EE has become a national mandate in all schools. It is however fair to conclude that plant-based education, a more specific component of EE is still a developing area.

2.1 Formal Education

1. Mandatory National Curriculum

Chinese Ministry of Education develops the syllabus of subjects.
Primary Schools- plant based education is taught in Science class in Primary 4-5 and includes materials related to biodiversity conservation. During the course of primary school, students will have written tests.

Junior High Schools- Botany class includes education on plant identification and introduction of the importance of plant diversity conservation. Specifically, the curriculum includes Environmental Studies, in which two chapters, "Biology and the Environment", and "Man and the Environment" are most relevant. These chapters talk about environmental factors, ecosystem, stability of the biomass, biodiversity and conservation. However, there is no requirement on biological classification or appreciation. As a result, these aspects are not covered in classroom teaching. Botany is not examined in the public examination but is a compulsory subject.

New textbooks introduced in 2000 by the Ministry of Education's Curriculum Research Center which will be gradually used in schools throughout China are less focused on knowledge and skills of discrete subject areas and more on integrated and interdisciplinary subjects. Therefore EE is now taught in all subject areas (including science, language and biology (Lin and Ross, 2005)).

2. After school education
Usually organised by co-operative administration of departments in charge of education, culture, physics, workers union, communist youth league, committee for women's and children's work and science and technology. Scientific activities which may involve plant education are organized by childrens clubs, scientific and technological centers for teenagers.

3. Exploratory activities organized by interest groups
Schools (mostly green schools, see below) with better resources organise interest group on plants and regular outdoor activities aiming to explore plant knowledge. Some schools designate areas to build nurseries to promote plant research whilst other schools may build a simple greenhouse for growing plants. Some schools launch community environmental projects, design "case studies" where they collect and process data aswell as provide practical solutions for certain environmental problems.

4. 'Certified' and non-certified Green schools/campuses
Green schools promote a "green" curriculum, administration, way of living and environment. Since 2000, green school certification was issued by SEPA and Ministry of Education with emphasis on hands on learning and research based interdisciplinary environment subjects (Lin and Ross, 2005). The environmental content and value taught in each green school varies and usually depends largely on teachers own interest and enthusiasm. In 2006, it was conservatively estimated that there were 20,000 Green schools at all levels.

5. University and higher education
University degrees in Biology are widely offered. Biology faculties offer many plant related disciplines.
In recent years, the introduction of environmental studies, tertiary degrees and institutions, particularly in the area of prioritizing environmental protection to ensure economic development are attracting students and funding (Lin and Ross, 2005).

2.2 Non Formal Education

1. Scientific education bodies organize activities (technology activities).
The government has requested all levels of scientific research bodies to regularly organize public education activities. Government departments also often organize promotional activities, such as the Biodiversity Conservation Month and Scientific and Technology Activities Week.

2. Special feature reports by the mass media
The mass media such as television and radio stations often produce feature reports or promotions on plant education. ie. celebrating World Environment day.

3. Exhibitions
The government and various educational bodies often organize exhibitions featuring different plant knowledge. In particular, larger botanical gardens in China all have a museum on plant education.

4. Tourism
More members of the public can afford to travel. When they travel, they would directly or indirectly learn about plants.

5. Urban greening
The concept of the city's need of plants has received more recognition amongst the public. The public are now more aware and concerned about green space for their own well-being and the appreciation of plants on the whole. Home gardening is gaining more popularity amongst Chinese people due to changing lifestyles and increased time for leisure.

6. Environmental NGO's
Local environmental NGO's has greatly influenced EE through educational policy and practice (ie. Friends of Nature, Global Village of Beijing). Transnational NGO's also aim to promote environmental awareness (ie. WWF, Roots and Shoots).

Stakeholders:

A. Ministry of Education

Develops, manages and implements guidelines and policies for China's educational undertakings. EE topics are incorporated in primary and secondary curriculum. The Ministry of education also undertakes environmental training and studies in teacher education programmes and research institutes.

B. State Environment Protection Adminstration (SEPA)

The role of SEPA is to disseminate national environmental policy and regulations, collect data and provide technological advice on both national and international environmental issues. In regards to EE, SEPA also organize, supervise and coordinate the EE, publicity and publication and to promote the participation of the public and non-governmental organizations in the environmental protection. SEPA's Center for Environmental Education and Communications (CEEC) initiates and coordinates China's Green School programme which started in 2000 as part of international efforts to promote the concept of the 'ecological school'. The programme encourages schools to make use of its educational resources - both inside as well as outside of schools - in favour of the environment and to integrate EE into school curricula.

C. Ministry of Science and Technology (MOST)

Coordinates and organises all China's official S&T activities, provides policy guidance on the S&T systemic reform agenda, and formulates policies on how to strengthen basic and applied research and technology development, especially in the high tech area. The Ministry provides funds for S&T programs in both basic and applied research.

D. The Chinese Academy of Sciences (CAS)

CAS is a leading academic institution and comprehensive research and development center in natural science, technological science and high-tech innovation in China. CAS loosely manages over 100 independent research institutes, which conduct scientific research in all branches of the natural sciences. Each Institute's funding is an amalgam of resources coming from CAS Headquarters, MOST and the National Natural Science Foundation of China (NSFC)

E. Local Government and Industry

The interaction of industry and government at the local level influences environmental policies (including EE). Communication and linkages between local government agencies is not significant.

F. NGO/NPO's

Most local environmental (government sponsored or independent) focus on EE and community development. Whereas most international organisations generally focus on issues concerning China and the international community (ecosystem preservation, greenhouse gas emissions etc.).

G. Citizen Interests Groups

Groups formed on ad hoc basis and informally to voice opinion on threats to the ecosystem (ie. demonstrations). Also formed by student groups from colleges and universities.

H. Public education (Chinese news media, education/public recreation centres

Environmental journalism (newspaper, television and radio) as well as educational media for children (childrens magazines) educate the general public about EE. Botanical Gardens, museums and other public centers/tourist destinations provide EE through exhibitions etc.

3. Is T14 is sufficiently covered within formal and informal education in your country?

3.1 Formal education

Growing awareness of the importance of plants in formal education has been demonstrated by introducing plant based education in the curriculum, teacher training and EE school activities. However, teaching of plant diversity is much weaker than animal diversity in relation to their respective scope of content, curriculum and examination. Although teachers and students often learn about biodiversity conservation, more attention is paid to the conservation of wild animals. Therefore curriculum that covers plant diversity receives even less attention.

3.2 Informal education

Public participation such as tree planting activities, able to identify tree species indicate that the public has shown increased awareness of plant conservation. Some government bodies have a system to keep regular records of climate observation and atmosphere monitoring. Such data can help in plant education. This shows the concerned government departments have started to value the inter-dependent relationship among the environment, plants and mankind. There are more resources on plant based education through mass media including the internet, newspaper, magazines, television and books, to learn more about plants. This is a major improvement compared to the past.

The central government has shown more recognition towards scientific education. This was demonstrated when the central government began to award the Prize for the Popularization of Science and the stipulation of the Law of the People's Republic of China on Popularization of Science and Technology. Laws and regulations in plant protection and environmental conservation are being refined substantially with time. New laws in environmental conservation have also been formulated. More non-governmental organizations such as Friends of Nature are being formed and more volunteers participate in plant protection and help to publicise plant education.

The concept of the city's need for plants and greening has received more recognition amongst the general public. The public are more aware of green space and its influence on their well being and the protection of plants in general.

4. What examples are there of good practice – what works well?

4.1 Informal

Botanic Garden environmental education

Title of Case Study

Unexpected Guests – Exhibition on Biological Invasion in China, 14 October 2005 – 10 February 2006.

Name of author, organization, role in organization, address and email

Exhibition organized jointly by:

The Science Popularization Office of the Chinese Academy of Sciences;

Beijing Botanical Garden, Institute of Botany, Chinese Academy of Sciences; and

CAS Key Project Research Team on Invasive Species.

Venue of the exhibition:

Beijing Botanical Garden, Institute of Botany, Chinese Academy of Sciences

20 Nanxincun, Xiangshan, Beijing 100093, China

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Aim of education/public awareness programme
To raise awareness of the public about the actual and potential harm biological invasion may bring to the environment, biodiversity, economy and people's life, and what to do (or not to do) to prevent introduction of alien invasive plants and animals.

Who is/was the programme aimed at?
The programme aimed at the general public, including school children.

How does/did the programme address T14?
Through the exhibition, the audience became aware of the importance of both biodiversity and the danger biological invasion may bring to the biodiversity and the environment.

How is/was the programme delivered?
The exhibition was designed, prepared and held in the Beijing Botanical Garden for visitors to the Garden.

Evaluation. What were the results of the programme? What worked well? What didn't work well?
Judging from the comments written on the guest book of the exhibition, the audience enjoyed the exhibition and the message was well received. The exhibition was held in the mostly off-peak season and this somewhat restricted the size of the audience.

What challenges and opportunities do you face in implementing T14?
People need to be interested in light-hearted ways to receive the important message of biodiversity conservation. There is great potential for educators to broaden the topics and deliver them in more interesting and impressive ways.

Conclusions
Botanical gardens are ideal places to draw attention of the public and communicate to them about the importance of plants and conservation.

4.2 Formal

Green School collaborating with NGO on a plant conservation project

Title of Case Study

Survey on the Historical Changes of Ancient Trees in the Xiannong Altar, a Roots and Shoots programme

Name of author, organization, role in organization, address and email

Chen Hong-cheng, Zhu Xu-bing, Beijing Yucai Secondary School, email: 53chc@sohu.com

Aim of the programme

Today Chinese people are more conscious about heritage conservation and environmental protection, as Beijing is preparing for a green and culture-focused 2008 Olympics. It is our responsibility to educate secondary school students, who have been learning and living in the Xiannong Altar area, more about the history of ancient trees and their current status. To this end, under the guidance of Biology teachers, Beijing Teaching Botanic Garden experts and archeologists, we conducted a comprehensive survey on the historical changes of ancient trees in the Xiannong Altar so as to understand the changes in the vegetation cover. After the survey, we recommend rebuilding the original appearance of the Xiannong Altar.

Who was the programme aimed at? All students in our school, residents in the community

How did the programme address Target 14? Surveys, interviews, promotion and giving recommendations.

1. Data collection, research

- Visited the data repository room of the Beijing Ancient Architecture Museum and other exhibition halls to check relevant historical data;
- Visited the Beijing Municipal Bureau of Parks, the Xuanwu Bureau of Parks, and the Greening Office of the Urban Construction Unit for Bridges and Streets to check text-based and image-based data;
- Visited the Beijing No. 1 Repository Museum to check historical data during the Ming and Qing Dynasties;
- Visited the website of the Beijing Municipal Bureau of Parks to check relevant data;
- Visited the capital library and the Xuanwu district library to check data on ancient trees and parks;
- Visited the Yucai School's library and data room to check data.

2. Interviews with specialist scholars and those concerned in order to have a better understanding

- Visited the Beijing Botany Association and Beijing Parks Society to interview experts and to understand more;
- Paid visits to archeologists and experts of the Beijing Ancient Architecture Museum, asked them to give a brief introduction of the historical changes and recommendations on our activities;
- Paid visits to Yucai School's old teachers and some old residents who lived in the Xiannong Altar, and asked them to describe the past and recent changes.

3. Site visits, making video recordings and taking photos

- With assistance from Biology Group, the topical group conducted ancient trees of the outer altar and kept a detailed record;
- An in-depth survey on ancient trees in the inner altar was conducted. The altar was divided into different zones, namely the Ancient Construction Museum, Yucai School, some companies and the residence area. Detailed record, video and photos were kept for record;
- A comparison between the collected data and the only ancient tree left was made.

4. Have an estimation of the age of ancient trees and diagnose the growth of these trees

Evaluation-What were the results of the programme?

1. Short summary of the Historical Changes of Ancient Trees in the Xiannong Altar. From the conclusion of the above survey, we had a simplified timeline of the historical changes of ancient trees in the Xiannong Altar.

2. The need to protect and restore the historical appearance and status of the Xiannong Altar
Chinese people have always valued agriculture. In ancient times, China was an agricultural country. While Mr Sun Yat-sen highlighted the importance of the studies of agriculture and arboriculture, Mao Zedong put forward the slogan that encouraged "plantation, afforestation and making China a greener place". With increased awareness to protect cultural heritage and the environment, people today should protect the vegetation cover in the Xiannong Altar.

3. Protect both the vegetation and cultural heritage in the Xiannong Altar area
When Deputy Mayor of Beijing Mr Huang Qishan was asked to approve the proposal of cutting the ancient trees because of a renovation project at the Ming Dynasty Tombs for 13 emperors, he made this statement (according to "Jing Hua Times"): "Ancient trees are historical artefacts that are still living today. This part of history is still alive. We should give extra care and protection to them. Once an ancient tree is cut, it's irreversible." Since the Xiannong Altar is the place to pay respect to ancient farmers and to pray for favourable climate for agriculture, the vegetation cover at the Xiannong Altar is irreplaceable.

4. The need of a specialist department and professionals assigned for the work of protection
Currently the Xiannong Altar is used by many different parties. Vegetation cover is thus managed by different parties. The quality of protection varies. Comparatively there are more ancient trees in the Ancient Architecture Museum. Because of this, it needs more protection.

5. Parties and individuals in the altar area should be required to show justifications if changes to trees are to be carried out. Because of development needs, some ancient trees had to be removed so that construction works could be carried out. New plants or

flowers for replacement (to beautify the area) should be harmonious with the surrounding landscaped garden in the Xiannong Altar area.

6. Ancient trees under special protection need more research on ancient folklore and stories.

7. The changes of ancient trees in the Xiannong Altar are closely related to the society, economy and people's awareness on cultural heritage conservation.

What worked well? Interviews, site surveys
What didn't work well? Estimation of the age of ancient trees, research on data before the liberation

What challenges and opportunities do you face in implementing Target 14? In the process of our survey, we witnessed many stunning things. A small number of trees died. What I really want to say is that some of these dead trees were ancient trees. Some of them died because of lack of proper care. Other trees died because of artificial destruction and natural reasons. Certain trees were strangled to death because of creepers. Sadly management staff did not care and did not clear those creepers in time. We are most upset by this kind of behaviour. We have also seen the ancient trees in the Sky Altar, which were protected very well and showed healthy growth. When we compared ancient trees that received good protection and those that didn't, we could see the lack of protection management of ancient trees in the Xiannong Altar area. The reason why we conducted this survey is that we want to mobilise people to actively protect ancient trees.

We want people to know that Xiannong Altar has slowly been destroyed by ourselves. It will be gone quietly in the information era. As Henry Kissinger, former US Secretary of State, said, "With the technological power of the US, we can replicate your Circular Mound Altar and the Hall of Prayer for Bumper Harvest easily within a short period of time. But to replicate these ancient trees, it will take over a thousand years to accomplish this." In view of this, we should pay more attention to a balanced ecosystem. Then we can live in a better place.

People surrounding this place can also feel the natural atmosphere here. As long as we are concerned about environmental protection, soon Xiannong Altar will return to its historical appearance. Our lives will be better, too. The very unique royal garden that we live and study in, the Xiannong Altar, has a history of 600 years. This survey let us have a brief understanding on the historical changes of vegetation cover in this area. We also understood the role of ancient trees in historical heritage, the close relationship between tree protection, prosperity of a country and people's awareness in tree protection. We learned valuable knowledge that we could not obtain from books; and our awareness on culture and environmental conservation has increased.

Conclusion

The most prominent characteristic of research-based activities is that such activities can change the learning pattern of students. Such activities let students to have an initiative to

explore more knowledge and to solve problems. The learning process is exploratory. It encourages students to take the initiative to learn and to understand the process of a research project. More importantly, it gave students a valuable experience, helped them develop a correct attitude towards scientific research, and improved their persistence and interpersonal skills.
Awards received for this activity include:

- Outstanding Science Activity Award in the 2005 Beijing Innovation Contest among Secondary and Primary Schools
- Second Award on Practical Scientific Activities in the 2005 Beijing Innovation
- Outstanding Proposal Design Award in the 2004 Beijing "Environment Enrichment" Contest

5. What are the gaps for implementing T14?

1. Up to date and new plant education research is not being widely shared and distributed
As the scientific research results of scientific research bodies are not publicized, such results cannot be shared. Teachers who focus on plant education have no way to obtain news from the latest scientific developments. In recent times, even though well received, "Plants Magazine" a journal which specialized in plant education is no longer published. The journal has been replaced by a new journal renamed "Life Science".

2. Number of plant education staff are still not adequate and training not sufficient
In recent years, the number of staff engaged in plant education has increased. Due to rapid developments in science and technology, the workload of this industry has also increased, leading to an increased demand for staff. Many educational staff members work on a part-time basis. The output that they produce do not meet the demand of the public.

Currently, plant education staff need more and better capacity building. Their teaching approach is not very appropriate. As a result, on-the-job training for staff should be strengthened so as to increase their capability to teach. One area requiring special attention are nature reserves where staff are not professional enough with many lacking a good understanding of plants. They have not received any relevant training and cannot pass on plant conservation knowledge to the public. As a result, nature reserves cannot play the role of plant education so the goal of plant conservation is not usually achieved.

3. Teaching materials need to be improved (both within schools and outside schools).
High-quality suitable teaching materials on plants or EE in general are not common. The content of plant education textbooks cannot catch up to the speed of actual scientific development. This should attract the attention from educational bodies who should invest in more human and material resources to update plant education books. Innovative teaching materials on plant education should also be encouraged.

4. Economic value of plants receive higher recognition. Other values do not attract the same attention.
Although people are starting to care for plants, they only focus on the economical benefits that plants can provide to mankind. Very often people ignore the role of plants in nature as a whole. We should see plants, natural environment and social environment as one integrated issue. We should not talk about fauna conservation, environmental conservation or plant conservation independently.

5. Plant education is not part of the mainstream curriculum
School education does not value the importance of plant curriculum. Plant education is usually an optional subject or extra-curricular activity. Subjects included in public examinations often consumes valuable class time. EE in rural schools does not receive the same level of attention highlighting the significant deficiencies of resources and capacity in rural areas compared to those in the city.

6. Scientific education and publicity delivered by the mass media do not have a strong technical background and coverage of audience is not wide enough.
Although the mass media such as televisions, the internet, newspapers and magazines participate in public education, such education is usually not professional. People involved do not have knowledge of academic research and often disseminate wrong data. Because of this, the public often develops wrong concepts and may be misled. Currently plant education limits its target audience to students, specifically primary school students, some high school students and a small number of university students taking botany as their major. However, adults, older people, particularly stakeholders are not the target audience. The coverage of plant education recipients is not wide enough. It is not possible to develop a general awareness in plant conservation among all members of the public.

6. What are the recommendations for taking T14 forward?

1. Do not charge entrance fees to science education venues- the government should subsidise these venues
Due to financial concerns, visitors have to pay to get into many educational venues. This measure limits the number of visitors. It is hoped that the government could offer more financial aide so that all educational bodies could be open to the public for free.

2. Training and capacity building for education staff should be provided and reinforced.
Currently plant education staff needs better capacity building. Their teaching approach is not very appropriate. As a result, on-the-job training for staff should be strengthened so as to increase their capability in teaching. Very often the stakeholders and leaders do not have a good understanding on plants and are not aware of the importance of plants. As a result, they do not value plants. Through education and publicity raising, staff will gain understanding and more support for EE will be provided. Although the government departments say they highly value plant education, input in both human resources and materials resources is far too inadequate. The need of plant education cannot be met.

3. More environmental programmes for the public (construction works to display high-quality plant-based educational exhibits, multiple exhibition sites, outreach to countrysides)
It is hoped that through international bodies, efforts can be focused to initiate demonstration projects on plant education in order to attract attention from the public. Good exhibitions should not be limited to one place only. It should be on a tour to increase the number of visitors. Today, China has many tourist spots and nature reserves but often, these areas do not include plant education as part of their duties. It is recommended that the government include plant education as part of their daily operation at these tourist spots and nature reserves.

4. Resources should be integrated; community activity centers should be fully utilized.
It is hoped that various government departments can share their educational resources, such as teaching staff, venue and plant materials with other bodies. Community-based activity centers should be fully utilized to undertake plant education work.

5. Cooperation between school bodies and outside-school bodies (NGO's) should be reinforced.
Schools and community-based bodies should have a stronger relationship so they can launch plant education activities together. Plant education and public education should receive more recognition from functional departments of the government. Efforts in plant conservation and EE initiated by NGO's should receive support from different sources.

6. Environmental protection awareness among the public should be increased.
Although the awareness of environmental protection among the public has increased, it is far from desirable. We need to adopt many more strategies to increase this awareness.

7. Regular education should be reinforced. This should start from preschoolers. We should let the younger generation influence the older one.
As school education is still the main channel of plant education, such education should start from preschoolers. Once young children are taught well, these children can influence their parents.

8. Curriculum reform should be faster. Environmental protection awareness among teachers should be increased.
Education departments of the government should speed up curriculum reform. The awareness of environmental conservation among teachers should also be increased.

9. Publicity targets stakeholders should be reinforced, so that they will approve policies beneficial to plant conservation.
Stakeholders should receive more publicity, so that they can truly understand the role of plants and be able to make important decisions regarding plant conservation.

10. Programs that can help plant conservation should be actively launched.
The government, particularly plant conservation departments (ie. SEPA), should actively launch programs that can help plant conservation.

7. What indicators are proposed for T14's success and progress?

- Up to date and new plant education research being widely shared and distributed
- Increase in number of plant education staff and training provided
- Teaching materials improved (both within schools and outside schools).
- Integrated EE becomes the norm for EE (not only just focus on single environmental issues)
- Plant education becomes part of the mainstream curriculum
- Scientific education and publicity delivered by the mass media with professional environmental training and background

8. What are the most significant challenges and opportunities for delivering T14?

Challenges

- Capacity building is required. Teacher training needs to be provided in all sectors of EE.
- Development of better teaching resources and materials that are widely available
- Plant education (integrated approach) needs to be incorporated into curriculum
- Funding for EE not adequate despite China's growing economy

Opportunities

- More people are interested in professions in the environmental field who are highly motivated and willing to learn
- Wide spectrum of the public (students, adults) are willing to learn about the environment and how they can contribute to environmental protection
- Information is available (from local and international sources)– it needs to be distributed and appropriate professional training provided to disseminate the information to the general public

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