

Community Environmental Education is a key to rainforest and orangutan conservation: Lessons from Sumatra, Indonesia

By Panut Hadisiswoyo

For delivery at: The 2010 International Conference on Community Learning, National Chengchi University (NCCU), 16-17 January 2010, Taiwan.

ABSTRACT

Community environmental education (CEE) has the potential to act as a critical component to solve environmental problems and achieve goals for rainforest and orangutan (*Pongo abelii* and *P. pygmaeus*) conservation in Indonesia. CEE projects combined with community empowerment strategies can be put forward as front line intervention actions to achieve the goals of biodiversity conservation in Indonesia through improving the ability of communities to conduct sustainable and equitable management of their natural resources, based on local knowledge, need, and priorities. The results of the Orangutan Information Centre's programme the Aceh Community Conservation Initiative as well as the RARE Pride Campaign Programme indicate that working through a framework of community environmental education can provide benchmarks for action in the conservation of orangutan and rainforests and assist communities in reaching environmental solutions to local issues, promote voluntary participation, and provide local people with the skills and knowledge required to become environmentally active and effect real conservation on the ground.

Key words: *Conservation, Sumatra, Indonesia, community empowerment, environmental education, rainforest, orangutans*

INTRODUCTION

Education is a critical element in conservation efforts towards a more sustainable future (Hughes and Woolard, 2002; Jacobson *et al*, 2006). The need for education about the environment to communities

throughout the world will continue to grow as conflicts over natural resources increase by the day. The exponentially expanding human population is in large part responsible for this, thus in order for sustainability and conservation programmes to succeed community education and outreach must be carried out as part of the solution. Opposition by local communities to implementing ecosystem conservation is considered a major constraint to its success, and therein the community of focus must be seen as one of the main factors that affect the success or the failure of management efforts (Jacobson *et al*, 2006, Yaffee *et al*, 1996). Furthermore, Hughes and Woolard (2002) believe that education and community outreach are essential for promoting conservation policy, creating knowledgeable citizens, changing people's behaviors, garnering funds, and recruiting supporters and volunteers for conservation oriented programmes.

Community education shares many goals with the broader field of environmental education, which provides opportunities to gain *awareness, knowledge, attitudes, skills* and local *participation* (UNESCO, 1978). Jacobson *et al* (2006) pointed out that awareness, attitude, and knowledge enable communities to acquire an awareness, sensitivity, motivation and understanding of the environment and its associated problems. These skills will enable communities to identify and solve environmental problems and participation encourages communities to use their knowledge to become actively involved at all levels in working towards the resolution of environmental problems.

Environmental education for sustainable development can be defined as efforts to explain how the environment functions and the manner in which human beings can manage their behaviour and the ecosystem in order to live more sustainably (Smyth, 2006). Environmental education therefore also refers to developing a learning approach in order to enable human beings to manage and improve the relationships between society and the environment in an integrated and sustainable way. This is not limited to education within the school system, but it is also used more broadly to include all efforts to educate the communities about the environmental issues through various media including print materials, websites, television, radio, campaigns, and many others (Palmer, 1998). As a

result, environmental education has recently been introduced in a wide range of non formal education settings at work and at home through developing skills, knowledge and values that promote behaviour in support of a sustainable environment (Barraza *et al.*, 2003). There is considerable evidence that much of what we learn occurs outside schools. Cullingford (1992) for example asserts that children acquire most of the information about the world they live in and apply positive behaviours from informal sources, their parents and from peers and various media sources.

The main goal of environmental education is to deliver an effective conservation message and engage targeted audiences in the debate and call to action on a particular issue. It may include teaching a class or community groups, or producing informational leaflets, and/or giving a lecture or presentation. However, environmental education for the community should be a continuous and multi-staged learning process where communities become aware of their environment and acquire knowledge, values, skills, and experiences to understand and solve environmental problems for the benefit of present and future generations (Vaughan *et al.*, 2003).

Environmental education through a community education process or, what is known as CEE, can be considered a critical component to address some of the environmental problems and achieve goals for conserving and protecting the rainforest and the many high conservation value species of fauna and flora such as the orangutan (*Pongo abelii* and *P. pygmaeus*) as well as many others, in countries such as Indonesia. Conservation practitioners in Indonesia could spend years designing plans or studying biological processes, but these would be likely to fail in achieving their conservation goals if they do not consider local communities and gain public support for the programme - all of which can be attained through community environmental education and empowerment.

When communities are well informed and involved, conservation goals can be effectively achieved. Many conservation agencies and organizations in countries

such as Indonesia have utilized community environmental education as a powerful tool to address the issue of sustainability and explore local concerns and constituents to develop solutions and promote a broad conservation mission. Given the current state of environmental degradation and the plight of species extinction such as the orangutan in Indonesia, CEE is a potent tool that can and must be used to foster sustainable behavior, improve public support for conservation, reduce poaching in protected areas, improve compliance with environmental regulations, and influence policies and decisions that affect the environment and natural resources (Jacobson, 1999; Day and Monroe, 2000). The goal of this paper is to discuss the perspectives and the importance of community environmental education and its implication for rainforest and orangutan conservation efforts in Sumatra, Indonesia. Two examples of contemporary community environmental education projects developed by the Orangutan Information Centre will be drawn on as model community conservation programmes that successfully instill pride and generate community and conservation oriented action by local communities.

INDONESIA, BIODIVERSITY, AND COMMUNITY ENVIRONMENTAL EDUCATION

Located in two major biogeographical regions (*Indomalaya* and *Australasia*), Indonesia is an archipelagic nation of approximately 17,000 islands containing a multitude of tropical forest types and mountainous areas as well as extensive coastal and marine areas (McCarthy, 2002). With its diverse natural habitats, rich plant and animal resources and large numbers of isolated islands, a large percentage of Indonesia's species are found nowhere else in the world.

On a global scale, Indonesia contains 10% of the world's rainforests, which are ranked second in terms of size after Brazil. The Indonesian forests harbour the world's greatest diversity of palms, more than 400 species of *dipterocarps* (the most valuable commercial timber trees in southeast Asia)

and an estimated 25,000 flowering plants as well as a rich and diverse fauna (Albar, 1999).

Biological Diversity is the totality of genes, species and ecosystems in a region (WRI, IUCN *et al.* 1992), and Indonesia is recognised as a major world centre and hotspot for it. Although the country covers only 1.3 percent of the earth's land surface, it has 10 percent of the world's flowering plant species, 12 percent of the world's mammal species, 16 percent of all reptile and amphibian species, 17 percent of the world's bird species and 35 percent or more of the world's fish species (BAPPENAS, 1993).

However, with Indonesia's large population (the fourth largest in the world) and expanding economic needs, conserving this rich biodiversity presents an enormous challenge (McCarthy, 2002). National deforestation rates increased to over 1 million hectares per year during the 1990s (KLH & UNDP, 1997). At the same time, Indonesia has more species threatened with extinction than any other country, with 128 mammal species and 104 bird species under threat of extinction (IUCN, 1996).

Between 1950 and 2000, 40% of Indonesia's forests were cleared, reducing ground cover to 98 million hectares (FWI/GFW, 2002). Forest cover in Sumatra was reduced by 61% from 1985-1997 due to logging, infrastructure development, internal migration, and plantation development (McConkey, 2005). Consequently, Sumatran orangutans, one of the 25 most endangered primate species in the world, have been badly affected by this level of deforestation. Over the last twenty years, more than 80% of orangutan habitat has been degraded (WWF, 2004). Once widespread throughout the forests of south Asia to the southern Indonesian island of Java, are now restricted to and remain on just two islands in Indonesia and Malaysia. The orangutan is a unique primate and is very closely related to human beings in that 97% of their DNA matches ours.

Due to the conversion of forests to oil palm plantations, uncontrolled illegal logging, encroachment by illegal agriculture, road construction and wildlife poaching and trade, there are now just 10 remaining viable Sumatran orangutan habitat units. Over 90% of the population

is found within the Leuser Ecosystem (LE), which encompasses the Gunung Leuser National Park, which along with two other national parks makes up the Tropical Rainforest Heritage of Sumatra UNESCO World Heritage Site, listed in 2004. Experts estimate that 6,624 Sumatran orangutans remain in the wild currently, showing a decrease of 86% over the past 100 years (Wich *et al.*, 2008 ; Robertson & van Schaik, 2001). The plight of the species is exacerbated further by a lack of international funds, media attention, and community involvement in conservation management. Furthermore, there are alarmingly few active conservation initiatives in Sumatra and there is also a lack of programmes providing environmental education and conservation resources to indigenous communities in order to integrate local people into conservation initiatives. With so little time left to reverse the current trend of impending extinction of the species, there is an urgent need for conservation action in order to retain viable wild populations of wildlife such as orangutans and the need for community-centred conservation programmes becomes ever more critical in order to effectively achieve conservation goals for the sustainability of the ecosystem, orangutans and their rainforest home.

In recognition of the significance of Indonesia's biodiversity, over the last decade Indonesia has strengthened its legislative and policy framework to slow down the loss of primary forests and maintain biodiversity (McCarthy, 2002). However, the management of protected areas and wildlife conservation continuously faces problems such as a lack of public participation and a continual lack of law enforcement (KLH & UNDP, 1997). Thus, in order to avoid an environmental catastrophe and conserve as much of Indonesia's biodiversity as possible, the Indonesian government has established the Biodiversity Action Plan, with the following four priority areas for interventions (Nalang, 2003):

- *ex situ* conservation through community education and participation in conservation
- *in situ* conservation in terrestrial parks and protected areas;
- *in situ* conservation outside of protected areas (in production forests, wetlands and agricultural lands);
- *in situ* conservation of coastal and marine resources;

Hence, community education and participation has been put forward as the first intervention priority to achieve the goals of biodiversity conservation in Indonesia. This is because the success of conservation programmes in Indonesia relies on collective support from the local community and community environmental education will improve the ability of communities to conduct sustainable and equitable management of biodiversity based on local knowledge and wisdom (Nalang, 2003). Without the support, knowledge, and involvement of local communities, conservation of terrestrial and protected areas would not be sustainable. Since this was recognized, community environmental education has become the cornerstone of all conservation efforts by most conservation agencies and organizations in Indonesia.

A COMMUNITY ENVIRONMENTAL EDUCATION APPROACH

Community environmental education is developed through educating communities and empowering them with the skills, values, knowledge, and awareness to critically assess and take action over local environmental issues (Maser & Kirk, 1996). The key principles and practices include environmental peer-adult education, public participation, and environmental communication. Environmental peer-adult education promotes a holistic view of the environment and is aimed at educating within an ecological framework (Clover, Follen & Hall, 1998). Public participation seeks to engage local authorities, indigenous organizations and community members to ensure that all stakeholders are represented in the decision-making process (Maser & Kirk, 1996; Forbes, 1987). Communication strategies form an integral part of community environmental education programmes by helping to increase public awareness and knowledge of local environmental issues, helping to foster effective public participation and promoting environmental action (IUCN, 1995; Maser & Kirk, 1996; Keliher, 1997).

Based on the supposition that the principles and practices of community environmental education would aid conservation organizations and local

communities in the development, implementation and facilitation of effective conservation programmes, this paper seeks to explore two cases of contemporary community education used for orangutan conservation programmes in Sumatra. The programmes provide some indicative evidence that there are benefits to local community organizations when they work through a framework of community environmental education. *Case One: Aceh Community Conservation Initiative (ACCI)*

The Aceh Community Conservation Initiative (ACCI) was initiated in the Aceh Tenggara region, within the West Leuser habitat unit, which supports an estimated 2,508 orangutans, approximately 37% of the total surviving Sumatran orangutan population (Wich *et al.*, 2008). It is an innovative grassroots programme, promoting orangutan and habitat protection through the participation and empowerment of local communities to implement sustainable development action plans compatible with conservation. Through this programme, local communities have been involved in the entire process, from planning, implementation, and eventually complete independent management of locally-devised conservation action plans.

The main goals of the programmes are to raise awareness and stimulate grassroots actions to address the plight of the Sumatran orangutan and environmental conservation issues in Aceh, to implement capacity building and educational activities in local community areas adjacent to orangutan habitat to increase awareness, ownership, and responsibility for the environment, and to provide alternative livelihoods by developing sustainable programmes in community areas, compatible with local needs.

The ACCI strives to develop 'model conservation villages' that support the protection of orangutans and their ecosystem whilst simultaneously improving community livelihoods and natural resource conservation. Community environmental education has been designed as the main component of the programme. Communities are informed of the importance of forested natural areas, so that the environmental costs of development in the province can be decreased as much as possible. Alternative

livelihood schemes such as agroforestry, ecotourism development and other community action plans have been introduced as potential schemes for each individual model conservation village to implement. Within agroforestry systems, for example, the restoration of damaged forest and buffer zones will be promoted as important elements of orangutans' habitat matrix which can also serve the people living adjacent to these forests both economically as well as ecologically.

The ACCI has been developed in five target villages for a period of one year. Villages were selected based on their proximity to orangutan habitat and potential for, or evidence of, forest encroachment, observed unsustainable use of forest or other natural resources, existence of human-wildlife conflict, dependency on monoculture agriculture, and level of interest and enthusiasm in developing sustainable alternative livelihoods in the community.

Prior to implementation, a Participatory Rural Appraisal (PRA) was conducted, involving preliminary assessments and identification of the issues most important to key stakeholders in the villages. The PRA also identified community members with potential to be involved in the project and manage the ACCI through their role as Conservation Village Coordinators (CVCs). CVCs take part in a training programme in order to learn the skills to manage, plan, foster, and implement the village conservation action plan which are outlined through regular key community meetings and inclusive participatory planning.

Regular meetings are now underway to facilitate local appraisal. Community meetings also aim to facilitate the communication process to allow community members to express their views about the programme, the environment, and their involvement. A set of training programmes for CVCs and community members, comprised of various skills needed for the implementation of the community conservation programme were followed. These include: participatory community mapping, community mobilisation facilitation, community development planning, community forestry techniques, campaigning, outreach, and communication, as well as skills relevant to the site-specific programmes developed in conjunction with the communities themselves.

Focus Group Discussions (FGDs) have also been conducted to formulate conservation agreements and action plans tailored to each community participating in the programme. These are co-headed by appointed CVCs who help guide, manage, and oversee the discussion and help ensure that local needs are adequately covered. The FGD allows every interest group in the village to contribute to the development process, involving local and regional government officials, indigenous community organisations, womens' groups, religious groups, as well as youth organisations. This process has resulted in the drafting of a different action plan for each separate village.

At each of the meetings and also through informal lecture sessions, natural resource conservation concepts and themes are discussed and environmental films screened in the local language, as part of the community education process. Various educational and environmental promotional materials, including a special OIC designed activity book for children as well as posters and leaflets about the Sumatran orangutan and related conservation issues are also distributed. In addition to the initiatives aimed at mature members of the community, the ACCI team also conducts a school-based education and outreach programme that runs concurrently as part of their regular duties and with materials available through an OranguVan mobile environmental education unit. Local schools are visited and students receive environmental information and practical, youth oriented training on paper recycling, organic compost production, tree nursery propagation, and other topics. Through empowering local people and instilling a sense of care and responsibility, the ACCI has equipped Aceh communities with the tools and motivation needed for effective species and habitat conservation.

Case two: Pride Campaign

The Pride Campaign is a new approach to communicating conservation messages to local communities through a traditional education, social marketing and empowerment approach. It was adopted from RARE (www.rareconservation.org) and focuses on building support for conservation at the local level to dramatically build momentum for conservation. This is done through creating the

conditions necessary for initiating local policy changes, legislative reform, and new protected areas, shifting public behavior toward more sustainable practices, and focusing public attention on critically threatened ecosystems and species (RARE, 2009).

The pride campaign programme executed by the OIC utilises a charismatic flagship species, the orangutan, as a symbol of local pride and acts as a messenger to build support for habitat and wildlife protection. The campaign occurs in 2 sub-districts (Besitang and Sei Lapan) of the Langkat District at the southern part of Gunung Leuser National Park, North Sumatra, Indonesia.

The OIC's Pride campaign aims to shift illegal cultivation practices by local farmers in Gunung Leuser National Park forest area and to maintain the viability of the area as an important habitat for Sumatran orangutans. Permanent agriculture and organic farming systems that are more sustainable, environmentally friendly and economical are introduced to local farmers who are informed about the significance of the area as the habitat for Sumatran orangutans and the benefits of adopting permanent agriculture and organic farming systems.

This new system offers higher and more sustainable income to local farmers and at the same time will maintain the forest's life support system. They also receive training and technical assistance for using the techniques and finally adopt and practice the systems. The Pride campaign considers success to occur when there is a shift away from illegal cultivation and the population of the Sumatran orangutan in the area is secured.

In order to achieve the Pride campaign goals, the Theory of Change (ToC) model is adopted and used as a plan for a logical chain of events that begins with engaging a relevant community and results in tangible conservation outcomes (RARE, 2009). Special emphasis is made on understanding who the main stakeholders are and what activities are taking place. One of the products of this process is a stakeholder matrix which identifies these key players and their interest in the site. This matrix is used to identify and invite groups and individuals to a

"stakeholder meeting" during which participants work together (facilitated by the campaign manager) to develop an Initial Concept Model of key threats.

The Concept Model identifies the key direct, indirect, and contributing factors (or root causes) of the threats influencing the target site. Pride campaign managers then survey between 1 and 3% of the population of the target site to gather information on people's knowledge, attitudes, and behavior. The questionnaire validates the key threats identified by stakeholders in the concept model, and helps to rank these threats through a random sample of individuals living in and adjacent to the target area. The questionnaire survey data is analyzed and the concept model is revised in a second stakeholders meeting in order to enable the campaign manager to identify campaign objectives that focus on knowledge and awareness changes likely to influence key threats.

Before designing activities and a plan for accomplishing the pride campaign goals, SMART (Specific, Measurable, Action-oriented, Realistic, and Time-bound) objectives are created with clear indicators. These objectives are incorporated into a Project Plan that becomes the foundation for the campaign. Marketing tools are designed by local villagers based on their interests and need. These include billboards, calendars, posters, songs, radio jingles, music videos, sermons, children's books, and puppet shows which were created to make conservation messages more positive, compelling, relevant, and engaging for the local communities. Campaigns are continuously developed to appeal to people on an emotional level, generating an increased sense of pride and public stewardship that goes beyond mere awareness-raising. This Pride campaign employs sophisticated threat reduction metrics at every stage of the campaign, gathering meaningful evaluations of campaign goals and objectives by involving and engaging every segment of the community such as teachers, farmers, business and religious leaders, local elected officials, and the local residents.

In order to measure the behavior changes and reduction of key threats, a questionnaire survey is conducted again at the end of the campaign, and the results are used to compare pre-and post-campaign changes in knowledge, attitudes and behavior.

IMPLICATIONS OF COMMUNITY ENVIRONMENTAL EDUCATION

Community environmental education is a long-term strategy and a cumulative one, such that an instant transformation of attitude and action is unlikely (Hughes and Woolard, 2002). However, despite the fact that moving people from 'awareness to action' is not a simple task, outcomes of community environmental education can be measured through the level of changes in behavior of targeted communities over time. This will only happen if community environmental education does more than simply provide information to local communities. Programmes that only provide information and increase general awareness may not lead to the hoped for changes and action (Schultz, 2002; Jacobson *et al*, 2006). CEE then should provide more than information and general awareness and thus should offer values, new skills, and opportunities for people to practice new behaviours and take action themselves to increase community support for social change (Jacobson *et al*, 2006).

Furthermore, it is important to set a clear objective before we assess whether a community education programme generates true conservation action. As set out in the Pride Campaign programme, objectives should be specific, measurable, audience-focused, relevant, and time limited (SMART). With specific and measurable objectives in mind, CEE can specify numbers of people that will display desired concern or behaviours and even dates by which these changes will be achieved. Furthermore, programme results can be compared with anticipated outcomes to judge success when there are specific audiences and consider contextual needs and appropriate actions the audiences may wish to take.

The ACCI and Pride Campaign programmes by the OIC have engaged the specific local community to conserve Sumatran orangutans and their rainforest homes. Conservation friendly behaviours have been promoted and combined with providing

opportunities for communities to gain financially and ecologically . An alternative livelihood scheme and social change initiatives have been introduced and this makes the education programme more alive, compelling, practical, and compatible with the needs of the community.

Moreover, local communities have more access to learning opportunities through community environmental education. The CEE developed by OIC not only provides learning materials on conservation issues but also provides opportunities to develop life skills through informal lectures, discussion, meetings, and community training. The agroforestry scheme introduced by the OIC for instance has encouraged 90 local farmers to transition from depending on illegal agricultural practices to developing permanent agriculture by utilising a limited land base with agricultural crops and forestry trees to meet their livelihood needs. This agroforestry scheme has enabled farmers to generate additional subsistence through short term crops but at the same time contribute to the maintenance of beneficial ecological functions (van Noordwijk *et al*, 2003). In order to implement this multifunctional landscape practice, farmers initially undergo various agricultural training and informal meetings to understand the scheme. As a result, a farmer group has been established to implement this scheme and promote conservation behavior while safeguarding natural forests adjacent to their agricultural lands. This also means that the community has been represented in the decision making process for addressing the environmental issues surrounding the communities.

Through CEE initiatives, the OIC also now manages two new conservation and digital opportunity centres in ecotourism sites in the Gunung Leuser National Park with support and assistances from the Bamboo Community University Association of Taiwan and the Ministry of Foreign Affairs of Taiwan. These centres were established to support the OIC's community environmental education and to facilitate local communities in improving their

capacity in digital communications which can be utilized by local people to understand more about conservation issues and develop ecotourism for livelihood needs.

Furthermore, motivation and action by local communities to save critically endangered orangutans from poaching and the pet trade has increased due to our community environmental education activities. For instance, the OIC's ACCI education team consistently receives reports about illegal keeping of orangutans in the community from local people in Aceh Tenggara who had participated in the ACCI education programme. As a result, a significant number of orangutans being kept illegally in residences have been confiscated and are now in a rehabilitation and reintroduction programme, and are set to later be returned to the wild. There has also been pressure from the local community in Sei Lapan to reduce encroachment into the national park and to adopt agroforestry systems, by local farmers who received the Pride Campaign education programme. Consequently, local farmers are enthusiastic to learn more about agroforestry practices and want to help protect the national park.

This shows that community environmental education, designed with specific and action-oriented objectives, works well when local communities are well informed, involved and empowered with some opportunities to instigate their own actions that benefit the community and their environment. This proves that the principle of community environmental education can act as a model for effective conservation programmes for the sustainability of wildlife and rainforests.

CONCLUSIONS

Managing the environment for conservation requires a long term investment in community environmental education which will result in empowerment and sustainability for both people and wildlife. The initial results of the ACCI and Pride Campaign Programme indicate that working through a framework of community environmental education can provide

benchmarks for community involvement in conservation and assist communities in reaching environmental solutions on local issues, promote voluntary participation, and provide local people with the skills and knowledge required to help communities become environmentally active.

More importantly, community environmental education programmes will be considered more successful when ownership of the programme and environment management is delegated to local communities (Maser and Kirk, 1996). This means that when community education programmes managed by local authority or conservation agencies provide community members with the skills and resources and opportunities to critically assess local environmental issues, it is likely that a sense of connection to the local environment will be formed, which in turn may result in a commitment to improving the local environment.

Finally, the following quote by Baba Dioum (a Senegalese conservationist) (in Hughes, L. & Woolard, 2002) serves to highlight the need for the community environmental education movement: *"In the end we will conserve only what we love and respect. We will love and respect only that which we understand. We will understand only what we are taught or allowed to experience."*

References

- Albar, I. (1999). Indonesian Biodiversity. **1999**.
<http://www.geocities.com/RainForest/4466/biodiver.htm>
- BAPPENAS (1993). Biodiversity Action Plan for Indonesia, Ministry of National Development Planning/National Development Planning Agency, Jakarta.
- Barraza, L., Duque-Aristiza, A. M. and Rebolledo, G. (2003). Environmental Education: From Policy to Practice. *Environmental Education Research* 9 (3).
- Clover, D. E., Follen, S., & Hall, B. (1998). The Nature of Transformation: Environmental, Adult and

- Education, Ontario, Canada: Department of Adult education.
- Cullingford, C. (1992): 'As seen on television: the source of children's information', Chapter 3 of *Children and Society*. Cassell, pp. 15–38.
- Day, B.A., & Monroe, M.C. eds (2000) *Environmental Education and Communication for a Sustainable World: Handbook for International Practitioners*. Academy for Educational Development, Washington, DC.
- Forbes, J. (1987). Environmental education-- Implications for public policy, *The Environmentalist*, 7(2), 131-142.
- Forest Watch Indonesia/Global Forest Watch (FWI/GFW). (2002). *The State of the Forest: Indonesia*. Bogor, Indonesia, and Washington, DC
- Hughes, L., & Woolard, S. (2002) Fish 'N' Chimps: Conservation Education in Action. *International Zoo News* Vol. 49/2 (No. 315) March 2002 pp. 67-72
- IUCN (1995). *Communication: An instrument of environmental policy*. Switzerland: Commission on Education and Communication.
- Jacobson, S. (1999) *Communication Skills for Conservation Professionals*. Island Press. Washington, DC.
- Jacobson, S. K., Mcduff, M. D. and Monroe, M. C. (2006). *Conservation Education and Outreach Techniques: Techniques in Ecology and Conservation*. New York: Oxford University Press.
- KLH and UNDP (1997). *Agenda-21 Indonesia A National Strategy for Sustainable Development*. Jakarta, State Ministry for Environment Republic of Indonesia, United Nations Development Programme.
- Maser, C., & Kirk, C. (1996). Local Community Development. In C. Maser (Ed.), *Resolving environmental conflict: Towards sustainable community development* (pp. 167-200). Florida: St Lucie Press.
- McCarthy, J. F (2002) Biodiversity Policy In Indonesia. http://www.sustainability.murdoch.edu.au/casestudies/Case_Studies_Asia/bioindon/index.htm. Retrieved in October 2007
- McConkey, K. (2005). Sumatran orangutan (*Pongo abelii*). In *World Atlas of Great Apes and their Conservation*. (ed. J. Caldecott & L. Miles), pp. 184-204: University of California Press.
- Meine van Noordwijk, James M. Roshetko, Murniati, Marian Delos Angeles, Suyanto, Chip Fay and Thomas P. Tomich (2003) *Agroforestry is a Form of Sustainable Forest Management: Lessons From South East Asia*
- Nalang, V.S., (2003) *Indonesian Biodiversity and Action Plan*. Indonesian Ministry of Environment
- Palmer, J.A., (1998), *Environmental Education in the 21st Century: Theory, Practice, Progress, and Promise*, Routledge.
- Rare (2009) *Building Local Constituencies for Conservation*. <http://rareconservation.org/programs/page.php?subsection=Rare%20Pride>. Retrieved on 5 January 2010.
- Schultz, P.W (2002) *Knowledge, Information, Household Recycling: Examining the Knowledge-deficit model of behavior change*. In Dietz, T. and Stern, P.C. eds *New Tools for Environmental Protection: Knowledge, Information, and Voluntary Measures*. Pp 67-82. National Academy Press. Washington, DC.
- Smyth, J.C. (2006) *Environment and education: a view of a changing scene*, *Environmental Education Research* 12(3,4):247-264.
- Vaughan, C., Gack, J., Solorazano, H., and Ray, R. (2003) *The Effect of Environmental Education on Schoolchildren, Their Parents, and Community Members: A Study of Intergenerational and Intercommunity Learning*. *The Journal of Environmental Education* 34, No. 3, pp 12–21
- van Schaik, C. P., Monk, K. A. and Robertson, J. M. Y. (2001). *Dramatic Decline in Orang-Utan Numbers in the Leuser Ecosystem, Northern Sumatra*. *Oryx* 35, pp.14-25.

- Wich, S. A., Meijaard, E., Marshall, A. J., Husson, S., Ancrenaz, M., Lacy, R. C., Schaik, C. P. v., Sugardjito, J., Simorangkir, T., Traylor-Holzer, K., Doughty, M., Supriatna, J., Dennis, R., Gumal, M., Knott, C. D. & Singleton, I. (2008). Distribution and conservation status of the orang-utan (*Pongo spp.*) on Borneo and Sumatra: How many remain? *Oryx* 42, pp.329-339.
- WRI, IUCN, *et al.* (1992). Global Biodiversity Strategy. Guidelines for action to save, study, and use Earth's biotic wealth sustainably and equitably, World Resources Institute (WRI), The World Conservation Union (IUCN), United Nations Environment Programme (UNEP).
- WWF. (2004). Orang-utan Fact Sheet. [Online] Retrieved on 22 July 2008 from: http://www.wwf.org.uk/core/wildlife/fs_0000000026.asp

Panut Hadisiswoyo is Founding Director of Orangutan Information Centre (OIC). The OIC is an Indonesian NGO dedicated to the conservation of Sumatran orangutans (*Pongo abelii*) and their forest homes. Our grassroots projects in Sumatra work with local communities living alongside the last remaining orangutan habitat. We plant trees, visit schools and villages, and provide training to help local people work towards a more sustainable future for their forests and environment.

Phone / Fax: +62 61 4147142

Email: info@orangutancentre.org

Website: www.orangutancentre.org