

The Success Factors of Public Consultation in the Establishment of a Biosphere Reserve - Evidence from Tasik Chini

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Abstract: Biosphere Reserves are the UNESCO's programmes to achieve sustainable development. One important prerequisite in the nomination of a new Biosphere Reserve site is the implementation of a public consultation with all stakeholders including the local community. This article analyses the stakeholder perception during a public consultation exercise conducted for the nomination of Tasik Chini as a Biosphere Reserve. The methodology involved a focus group discussion and a perception survey of 53 adults and 18 youths who participated in a public awareness programme held in 2008. The results of the analysis identified four main success factors of the public consultation programme: (1) an *in situ* public awareness programme cleverly and interestingly designed to adequately inform the stakeholders on the essence, elements and objectives of a Biosphere Reserve (BR); (2) the care taken by the organisers of the awareness and public consultation programme to get every segment of the stakeholders invited, represented and consulted; (3) the content of the awareness campaign which focussed directly on the benefits of the BR - the 'what's in it' - for the various stakeholders involved; and (4) the sequencing of the public consultation activities - where dissemination of knowledge and awareness creation preceded opinion gathering - had managed to convert an initial 70% ignorance to an eventual 100% acceptance of the BR project. In conclusion, it is essential to note that without sustained involvement of the local stakeholders the future of a BR will more likely than not be in peril.

Key words: Biosphere Reserve (BR) • Nomination of BR • Public consultation • Stakeholder perception

INTRODUCTION

Biosphere Reserves (BR) refer to areas of designation under the UNESCO Programme on Man and the Biosphere (MAB) have long been recognised in providing sites for conserving biodiversity and fostering sustainable development [1, 2]. It is the aims of UNESCO to designate and proclaim more Biosphere Reserves that meet the local needs. As such, any proposed area has to meet several procedures prerequisites set by the UNESCO's programme on Man and the Biosphere (MAB) and one important prerequisite is the implementation of public

consultation which aim is to inform impart knowledge to local communities with regarding Biosphere Reserves as well as to obtain their consent, support and cooperation [5-7].

A public consultation is a dynamic process of dialogue between individuals or groups, based upon a genuine exchange of views [7] and normally with the objectives of influencing decisions and policies or programmes of action [8-9]. Put simply, public consultation is a means for the public to voice their needs and knowledge concerning the specific project or development. Several studies had proven that taking the peoples' voices into account was a key success factor in

various community based project initiatives [4] including those concerning ecotourism [11], forestry resources [9], decision making on land rights [10] and conservation of Biosphere Reserves [8,12-13]. It was through public consultation that both stakeholders and grassroots community arrived at a mutual understanding as to the appropriate what and how of a proposed undertaking [14, 3].

Although numerous literatures showed highlighted the success stories of Biosphere Reserves, not much work on the locals' views had been reported during the nomination processes as well as during the feasibility studies [9, 2]. Yet, so crucial was the public's voice that Canning [13] in his work on the local conservation initiatives of the Upper Bay of Fundy Biosphere Reserve even emphasised on the importance of the public consultation to begin as early as possible particularly during the designation process. In fact, John's [15] feasibility study pointed to the capability of stakeholders to overcome several constraints hindering the entire process of realising the Biosphere Reserve on the Northeast Coast of St. Lucia. The major challenges included the absence of strong conservation policies, lack of control of land use development and inequitable economic benefits among locals. The resolution was envisaged in the structural changes of governance, constitutional reform and empowering the local citizenry.

The concern on the governance of Biosphere Reserve had received both international and national attentions [16, 3-4]. In this context the research engagement of universities and high level institutions was examined [16, 3] with some criticisms of their limitations on local community decision making [12-13, 17]. Attention was also directed to the NGO's roles, acting both as mediators and donors for community development, conservation and social learning of the Biosphere Reserve projects [18].

All this points to the importance of the acceptance aspects of the stakeholders involved in particular that of the local public in designated Biosphere Reserve areas. Questions of 'who constitutes the public', 'the locals' versus stakeholders' interests' and 'what makes the best method for delivering the right message' are some of the crucial components in a successful public consultation process.

Given that public consultation is essential in the nomination procedures of a BR a study on Tasik Chini's public consultation was undertaken during the process of its nomination. Based on this study this article analyses the perceptions and understanding of local youth and

adult members of the local communities on matters pertaining to the Biosphere Reserve concept and the potential benefits the locals may expect to gain from the nomination.

MATERIALS AND METHODS

The Biosphere Reserves: Biosphere Reserves (BR) which refer to areas of designation under the UNESCO Programme on Man and the Biosphere (MAB) have long been recognised in providing sites for conserving biodiversity and fostering sustainable development [1, 2]. Today, Biosphere Reserve forms a unique global network of special places for people and nature [2, 3] on at a regional and local scale [3]. Traditionally, a Biosphere Reserve comprises three zones of a legally protected core area, an adjacent buffer zone compatible to conservation and a transition zone for sustainable land use practices and development [4, 5]. Equally important, Biosphere Reserves integrate the cultural, social, economic and natural capital for sustainability of local livelihood and the ecosystem at large [5,6].

As of May 2011, there are 564 sites in 109 countries [5, 3]. Asia accounted for one of the largest areas of the total biosphere reserve. It is the aims of UNESCO to designate and proclaim more Biosphere Reserves that meet the local needs. As such, any proposed area has to meet comply with several procedures set by the UNESCO's programme on Man and the Biosphere (MAB) and one important prerequisite of which is the implementation of public consultation which aims to leverage local communities with Biosphere Reserve knowledge as well as to obtain their consent, support and cooperation [5-7].

The Study Area: This study was conducted in Tasik Chini, a remote area situated in the southern east of Pahang state. It had a diverse range of ecosystem and this includes a significant freshwater lake ecosystem, FELDA plantation scheme and Orang Asli (aboriginal) settlement. The lake ecosystem had multi-faceted functions of water retention, flood control, natural ecosystem of endangered species and settlement for the aboriginals Jakun tribes human settlement [19, 20]. This area was rich in historical and cultural resources with its mythical legend of sinking ancient cities which attracted local and international tourists. It had a population of 80 households with almost 500 people the majority of which were the Jakuns. Given all these features Tasik Chini was a precious ecological and heritage site to the state and the nation.

The pristine state of the Tasik Chini ecosystem was under threat, however, as there were many reported evidence of ecological problems there such as the disappearance of endangered flora and faunas, the decline in lake ecological function, the low water levels and the polluted river feeders [20, 21]. These problems correlated not just with rapid human activities such as plantation, logging and mining, but also and more importantly with lack of planned development and continuous monitoring [19, 21]. Bearing in mind that these problems need urgent integrated conservation and rehabilitation measures, both locals and international experts had called for the nomination of Tasik Chini as a designated Biosphere Reserve.

As a proposed Biosphere Reserve, Tasik Chini offers three main functions of development, conservation and logistic support. The first core zone is a legally protected area, which requires fulfilling the long-term conservation objectives. It includes a natural freshwater lake and its feeder rivers and terrestrial forest reserves surrounding the lake and water bodies. Existing forests and protected areas conserve a wide range of habitats and landscapes, covering approximately 70 km² [19].

The second buffer zone is for conservation and ecological uses and logistics. It includes all protected and un-logged major valleys and lake watersheds in the Reserve, totalling approximately 21 km². This area functions as a productive natural environment for migratory birds and other wildlife and at the same time, provides compatible public use in transportation and tourism. As a buffer and transition zone it promotes biodiversity and conservation.

The third transitional zone acts as areas for sustainable uses of natural resources within the locals' capacity. This area of 30 km² is where sustainable resource management and development is to be practiced [19].

Data Collection: This study was conducted during the public consultation programme of June 2008 organised by the Universiti Kebangsaan Malaysia's Centre for the Tasik Chini Studies. The public consultation programme was organised to create public awareness of the proposed move to nominate Tasik Chini as a Biosphere Reserve. The public awareness programme featured a talk, booth visits and a 'walking workshop' which allowed all stakeholder participants to interact and obtain information on Biosphere Reserve. Six main booths displayed specific themes of the BR, viz. floras, fauna, eco-hydrology, social aspects, economy and governance.

Two sets of data were utilised, one being the results of the walking workshop. Unlike a normal workshop, the participants of this 'walking workshop' were encouraged to visit every booth. Moving in a rotational and circular fashion, each group had ample time to gain knowledge of the Biosphere Reserve and on return to provide feedbacks with respect to traditional ecological and cultural knowledge. Once a group had finished visiting a particular booth, it continued to move on to the next booth until all six booths were visited. The workshop then proceeded to a more serious discussion of the Biosphere Reserve. In this the participants were distributed into six groups, each discussing specific topics of the flora, fauna, water and lake, community and economic activities, ecotourism and governance. The experts handled the workshop while the participants presented the workshop output as stakeholders. It was this output of their contributions depicting their overall understanding of the Biosphere Reserve concept that was analysed for the purpose of this article. Overall, the awareness programme was a successful event as it had attracted a crowd of 200 participants on day one and another 250 participants on day two.

The other source of data was the perception survey results of the participants as stakeholders which captured their understanding of the Biosphere Reserve, aspiration and opportunities to get involved in the social, economic and environmental programmes of the Biosphere Reserve. The survey was organised in one of the sessions of the public awareness programme. It managed to get the participation of 53 adults and 18 youths. Table 1 shows the socio-demography characteristics of the adult respondents of 20 males and 33 females and that of the nine male and nine female youth respondents.

As indicated in the table, most youths were in the age group of 16 while the adults were in several mature age groups. Most respondents earned about RM691-RM1200 (USD 245 - 400) as their monthly income and the majority had received formal education up to the secondary school level.

RESULTS AND DISCUSSION

The Overall Understanding of Tasik Chini Environmental Issues: Based on the focus group discussion, the results indicated that there was a mutual understanding on why Tasik Chini needed a Biosphere Reserve status. There seemed to be an agreement or consensus among the stakeholders on the imperative of efforts to save and restore Tasik Chini to its original pristine state. There was also the tacit agreement that

Table 1: Adults' and the Youths' Socio Demographic Background

Respondents	Aspect	Responses	Frequency	Percentage
Adults	Gender	Male	20	37.7
		Female	33	62.3
	Monthly Income	No mention	11	20.8
		RM381-RM690	2	3.8
		RM691-RM1200	15	28.3
		RM1201-RM1500	7	13.2
		RM1501-RM3000	16	30.2
		RM3001-RM5000	2	3.8
		Educational achievement	Primary school	5
		Secondary school, including PMR and SPM	27	51.9
		Higher Educational Examination STPM	5	9.6
		Certification/Diploma/University	15	28.8
	Place of residence	Local	13	25.0
		Non-local	39	75.0
Youths	Age	16 years	18	100
	Gender	Male	9	50
		Female	9	50
	Ethnicity	Malay	18	100
	School	Secondary school	18	100
	Local origin	Yes	15	83.33
		No	3	16.67

Table 2: Summary of the main environmental issues identified by stakeholders through the focus group discussion

Topics of Discussion	Group	Issues raised by members of the group
Importance of flora	1, 2	i. Need to preserve as it is a vital source of food. <i>Ara</i> trees are habitats for bats and squirrels
		ii. Need to preserve as it provides natural uniqueness for ecotourism
		iii. Stakeholders concerned should increase monitoring effort
		iv. Need to enhance stakeholder involvement in pollution awareness and control programmes
		v. Need to increase research collaboration with higher learning institutions in areas of biotechnology, herbs and sustainable ecosystem.
Importance of fauna	1,2	i. Need to avoid illegal hunting to preserve wild life.
		ii. Need to control forest exploitation.
		iii. Need to enhance awareness campaigns and law enforcement.
Eco-hydrology	3,4	i. A serious lake management issue is the disturbance of natural water ecosystem due to development of barrages and dam.
		ii. Need to prevent water erosion
		iii. Need to address the problem of lotus depletion
		iv. Need to address the problem of Phytoplants being disturbed and endangered by boats and tourists.
		v. Need to address the problem of social problems related to immoral activities among youths
		vi. Need to address unemployment and alcoholism problems among <i>Orang Asli</i> youths
Ecotourism and Governance	5,6	i. Increase tourism facilities - accommodation, open space, recreational activities, handicraft centre
		ii. Due to high water level, lotus population had decreased substantially
		iii. Over plucking of lotus due to influx of tourists and outsiders
		iv. Governance for sustainable development
		v. Expectation of Biosphere Reserve - increased socio-economic well being of local communities

Table 3: Stakeholder knowledge of the Biosphere Reserve

Aspect	Response	Frequency	Percent
Do you have any knowledge about BR ?	Yes	10	18.9
	No	38	71.7
	Not sure	5	9.4
Do you have any knowledge about Tasik Chini nomination?	Yes	19	35.8
	No	29	54.7
	Not Sure	5	9.4

Table 4: Stakeholder views on the elements and benefits of the Biosphere Reserve

Biosphere Reserve (BR) elements and benefits	Stakeholder Views	Mean Value	Ranking
On the elements of a Biosphere Reserve	A BR is governed by a responsible agency to ensure control and well-being of development and natural environment	4.68	1
	A BR is about sustainable development	4.53	2
	A BR is about biodiversity	4.49	3
	A BR is a living laboratory	4.38	4
	A BR is where the core areas not to be disturbed by people	4.23	5
	In a BR people are free to continue everyday life	3.89	6
	Average Mean	4.36	
On the benefits of a Biosphere Reserve	Tasik Chini establishment as a world eco-tourism destination would benefit the locals	4.64	1
	Tasik Chini establishment as a world eco-tourism destination would job opportunities for the young generation	4.57	2
	The sustainability of Tasik Chini ecosystem would be ensured	4.53	3
	Tasik Chini would be known world wide	4.49	4
	The development of Tasik Chini as a world eco-tourism destination would enhance the self esteem of the locals	4.36	5
	The development of Tasik Chini as a world eco-tourism destination would bring ample facilities to family and children	4.30	6
	The development of Tasik Chini as a world eco-tourism destination would generate a sense of belonging and togetherness	4.28	7
	The development of Tasik Chini as a world eco-tourism destination would not bring any benefits	2.49	8
	Average Mean	4.21	

Table 5: Youths' perception of the benefits of the Biosphere Reserve Programme

Rank	Benefits of Biosphere Reserve	Response	Frequency	Percent
1	I am proud if Tasik Chini is in the world map of Biosphere Reserve	Yes	18	100.0
		No	0	0.0
2	I enjoy visiting all exhibition booths.	Yes	17	94.4
		No	1	5.6
2	I gained new knowledge applicable to the science subjects taught in school.	Yes	17	94.4
		No	1	5.6
4	I now appreciate my village and Tasik Chini more	Yes	16	88.9
		No	2	11.1
5	I interact with many people during this programme	Yes	15	83.3
		No	2	11.1
5	I look forward to joining 'RAKAN BR' (Friends of the BR) organisation	Yes	15	83.3
		No	3	16.7
5	I would like to join other public consultation programmes in the future	Yes	15	83.3
		No	3	16.7
8	I can apply the lesson learned from this programme in my class, especially in Geography, Local Studies and History.	Yes	14	77.8
		No	4	22.2
8	I am excited about the future of Tasik Chini.	Yes	14	77.8
		No	4	22.2
10	I will tell my family and friends what I learn today	Yes	13	72.2
		No	5	27.8
11	I have a clear picture of what a Biosphere Reserve is.	Yes	9	50.0
		No	6	33.3

programmes to save the Tasik Chini environment must be with the locals' consent and involvement. It was recommended that public awareness campaigns be conducted on regular basis to keep the stakeholders sensitised and updated on the knowledge and progress of Tasik Chini as a BR. Table 2 summarises the main environmental issues identified through the focus group discussion.

The Community Understanding of Biosphere Reserve:

In the survey, questions on Biosphere Reserves were posed to respective participants. Most of the participants agreed that their knowledge about the Biosphere Reserve was minimal (Table 3).

Instead, they themselves posed questions concerning the implementation and development of the proposed Tasik Chini BR, especially on 'who owns the area', 'how can they get involved' and 'what benefits would the locals gain from the Tasik Chini nomination as a BR'. While it is common to have doubts on the proposal, the respondents agreed to support and involve themselves directly in the programmes, as they believed the holistic idea of Biosphere Reserve would uplift their livelihoods and wellbeing. What was more important, according to the local aboriginal head, the Tok Batin, 'All have the chances of receiving the benefits of BR, the Orang Asli, Felda people and the lake itself.'

The survey also sought respondents' perception of the nomination process of Tasik Chini as a BR. The responses were quite similar to the answers given for their knowledge of BR. More than 70 percent of the respondents did not know the nomination of Tasik Chini as Biosphere Reserve. When asked to elaborate on the Biosphere Reserve components they gave a wider spectrum of an ideal BR functional components as shown in Table 4.

These findings furnished the evidence that the local community understood the general concept of sustainability as the essence of Biosphere Reserve. The average mean for Biosphere Reserve elements was 4.36 with the scores of four BR elements exceeding the average mean. These pertained to elements of 'responsible agency', 'sustainable development', 'biodiversity' and 'living laboratory'. The majority of the respondents ranked responsible governance the highest to ensure proper development and well-being of both people and the natural environment concerned. This was followed in descending order by sustainability, biodiversity and living laboratory with mean values of 4.68, 4.56 and 4.49, respectively.

In terms of BR benefits, the respondents ranked in descending order the recognition of Tasik Chini as an ecotourism destination, job creation for young people and sustainability of the lake ecosystem. The highest ranked given to ecotourism had to do with the stakeholders' faith in the potentials of this sector to add to the value chain of the local economy, as some recalled that the villagers had operated their own trails to serve both international and domestic nature lovers since 1970s. The above results indicate that that even though the elements of Biosphere Reserve were new to the locals they were able to identify them with their traditional and informal understanding of safeguarding their home, land and community.

The Youth Understanding of Biosphere Reserve:

Compared to the adults, the youths were more specific on their stakeholder perception of the roles of a Biosphere Reserve. More than 80% of the respondents agreed with the BR perspectives (Table 5).

They perceived the programme as having helped them to appreciate and visualise the multi-faceted functions of Tasik Chini as a venue for living harmoniously with nature. Most importantly, this perception had prompted them to want to join the 'Friends of Biosphere Reserve' (*Rakan Muda* BR) an organisation designed to get young people involved in Biosphere Reserve support programme.

The above results also indicate that youths were more responsive to the concept of Biosphere Reserve. Their willingness to get practically involved in the programme means they can be positive agents of change. They seemed inclined to the international potentials of the BR as they were keen to widen their social networking through the 'Friends of Biosphere Reserve' and other international collaborations.

CONCLUSION

This study provides empirical evidence of four main success factors of a public consultation programme with regard to the proposed nomination of Tasik Chini as a Biosphere Reserve (BR). Firstly, an *in situ* public awareness programme cleverly and interestingly designed to adequately inform the stakeholders on the essence, elements and objectives of a Biosphere Reserve (BR). Secondly, the care taken by the organisers of the awareness and public consultation programme to get every segment of the stakeholders invited, represented and consulted through the walking workshop and focus group discussion sessions. Thirdly, the content of the

awareness campaign which focussed directly on the benefits of the BR - the 'what's in it' - for the various stakeholders involved. Finally, the sequencing of the public consultation activities - where dissemination of knowledge and awareness creation preceded opinion gathering - had managed to convert an initial 70% ignorance to an eventual 100% acceptance of the BR project.

While future public consultation programmes would do well to emulate the success factors of this particular public awareness programme, it is essential to note that such public consultation approach needs to be a regular feature of the Biosphere Reserve governance. For without sustained involvement of the locals the future of a BR will more likely than not be in peril.

REFERENCES

1. Batisse, M., 1982. The Biosphere Reserve: A tool for environmental conservation and management. *Environmental Conservation*, 9(2): 101-111.
2. Bridgewater, P.B., 2002. Biosphere Reserves: Special places for people and nature. *Environ. Science Policy*, 5(1): 9-12.
3. Duranda, L. and L.B. Vázquez, 2011. Biodiversity conservation discourses. A case study on scientists and government authorities in Sierra de Huautla Biosphere Reserve, Mexico. *Land Use Policy*, 28: 76-82.
4. Schultz, L., A. Duit and C. Folke, 2011. Participation, Adaptive Co-management and Management Performance in the World Network of Biosphere Reserves. *World Develop.*, 39(4): 662-671.
5. UNESCO, 2011. Biosphere Reserves - Learning Sites for Sustainable Development. Retrieved from [http://www.unesco.org/new/en/natural-sciences/environment/ecologicalsciences/Biosphere Res.](http://www.unesco.org/new/en/natural-sciences/environment/ecologicalsciences/Biosphere_Res.), pp: 28.
6. Wallner, A., N. Bauer and M. Hunziker, 2007. Perceptions and evaluations of Biosphere Reserves by local residents in Switzerland and Ukraine. *Landscape and Urban Planning*, 83: 104-114.
7. Shurcliffe, K., J. Singleton and R. Sulaiman, 2002. Public Consultation and disclosure plan-Collaborative Management Plan Komodo National Park Indonesia. Retrieved from [http://www.ifc.org/ifcext/spiwebsite1.nsf/7a881f3733a2d0785256a550073ff0f/f57adce1d1d922185256c71007ebf7a/\\$FILE/Komodo%20PCDP%20final.pdf](http://www.ifc.org/ifcext/spiwebsite1.nsf/7a881f3733a2d0785256a550073ff0f/f57adce1d1d922185256c71007ebf7a/$FILE/Komodo%20PCDP%20final.pdf), April 3 2011.
8. Sitikarn, B., 2007. Public participation: Is it a means of achieving sustainable tourism? Retrieved from <http://resource.mfu.ac.th/upload/789.pdf>. October 10, 2008.
9. Taylor, P.T., 2010. Conservation, community and culture? New organizational challenges of community forest concessions in the Maya Biosphere Reserve of Guatemala. *J. Rural Studies*, 26: 173-184.
10. Jianying, X., L. Chen, Y. Lu and B. Fu, 2006. Local people's perceptions as decision support for protected area management in Wolong Biosphere Reserve, China. *J. Environmental Manage.*, 78: 362-372.
11. Li, W., 2004. Environmental management indicators for ecotourism in China's nature reserves: A case study in Tianmushan Nature Reserve. *Tourism Manage.*, 25: 559-564.
12. Fraga, J., 2006. Local perspectives in conservation politics: the case of the R'ya Lagartos Biosphere Reserve, Yucat'an, Mexico. *Landscape and Urban Planning*, 74: 285-295.
13. Canning, C., 2005. Conservation and local communities: exploring the Upper Bay of Fundy Biosphere Reserve. Retrieved from http://www.bofep.org/PDFfiles/Caroline_Canning_Final_Thesis.pdf, 8 January 2011.
14. Lü, Y., L. Chen, B. Fu and S. Liu, 2003. A framework for evaluating the effectiveness of protected areas: the case of Wolong Biosphere Reserve. *Landscape and Urban Planning*, 63: 213-223.
15. Makedah, L.J., 2010. Investigating the feasibility of establishing a Biosphere Reserve on the Northeast Coast of St. Lucia. Retrieved from http://uwspace.uwaterloo.ca/bitstream/10012/5255/1/MES_Thesis_Makedah_20John%202010.pdf, 5 April 2011.
16. Schliep, R. and S. Stoll-Kleemann, 2010. Assessing governance of Biosphere Reserves in Central Europe. *Land Use Policy*, 27(3): 917-927.
17. Ericson, J.A., 2006. A participatory approach to conservation in the Calakmul Biosphere Reserve, Campeche, Mexico. *Landscape and Urban Planning*, 74(3-4): 242-266.
18. Frazier, J., 2006. Biosphere Reserves and the "Yucatán" syndrome: another look at the role of NGOs. *Landscape and Urban Planning*, 74(3-4): 313-333.

19. Habibah, A., J. Hamzah and I. Mushrifah, 2010. Sustainable livelihood in Tasik Chini Biosphere Reserve. *J. Sustainable Develop.*, 3(3): 184-196.
20. Toriman, M.E., Mohd M.K. Amri, I. Mushrifah, J. Nor Rohaizah, G.M. Barzani and Nor A.A. Azlina, 2009. Sediment concentration and load analyses at Chini River, Pekan, Pahang Malaysia. *Research J. Earth Sci.*, 1(2): 43-50.
21. Barzani, G.M., B.S. Ismail, A. Sahibin, Rahim, I.M. Sujaul and C.C. Tan, 2007. Hydrology and water quality assessment of the Tasik Chini Feeder Rivers, Pahang. *American-Eurasian J. Agriculture and Environmental Sci.*, 2(1): 39-47.