



What users said about urban green space: A challenge for building the resilient city of Banjarbaru, Indonesia

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Abstract

As providers of ecosystem services, green spaces within the city of Banjarbaru, Indonesia, have significant benefits for the wellbeing of residents. A case study examining user opinion regarding the importance of urban green space was conducted during the last three semesters of 2011-2012, with around 800 respondents participating in a 24-question interview. The users questioned expressed their opinion of existing green spaces and also gave suggestions as to how to sustainably manage green space for a resilient city. Direct observation of 46 green spaces was conducted to complement the interview data, with the variables observed including the presence of benches and tables, sports fields, running tracks and machines for physical exercise, as well as vegetation types and abundance. A synthesis analysis method was used both to elaborate respondents' opinions and suggestions, green space condition and literature data, and to synthesise a conclusion from a social-ecological viewpoint. To summarise, although respondents were willing to support the creation of a resilient city through green space-based sustainable development, and enjoy spending their time doing activities in the provided green spaces, some had little experience of green city programmes, while others also believed that existing green spaces need to be better managed in order for their environmental, social and economic benefits to be developed.

Keywords: City greening, Resilience, Social capital, Urban green space

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1. Introduction

Often referred to as 371.38 km² surrounded by reality, the city of Banjarbaru in South Kalimantan Province, Indonesia, is the Provincial Administration City and home to the University of Lambung Mangkurat. Banjarbaru is also the province's smallest city, with a population of around 170,000 living at a density of approximately 462 people and 123 households per km². Located at an altitudinal range of 0 to 500 metres above sea level and with an elevation range of 0 to 15%, the city lies in a highland region bordered by the foothills of the Meratus Mountains and swamp, with an area of around 5,831.5 ha. Like other cities in the region, Banjarbaru is currently experiencing substantial population growth and with it, increasing environmental and social pressures (The City Statistical Board, 2010; Alberti and Marzluff, 2004)

The impact of the City Government on the environment can be summarised using the following statistics for 2010: 515,175 km of streets; 9,372 ha of parks; 40,465 ha of built-up areas; 70,715 vehicles and 62,050 tons of garbage and recyclables. Banjarbaru's municipal energy use in 2010 is around 138.80 million kWh of electricity, 8,960 Ml water, 1.3 million therms of natural gas and 9.5 million gallons of fuel, for consumption by public transport and private households, among others (Krisdianto et al., 2010).

The environmental, social and economic aspects of the urban system in Banjarbaru will almost certainly receive more attention in the future, which from an urban social ecology viewpoint will likely include an examination of the city's ecosystem services. However, the integration of these factors will not happen unless local inhabitants see the needed change as being positive, a fact which is frequently overlooked. Recently there has been a call for more inter-, trans- and multi-disciplinary research within urban ecology, frequently focusing on urban green space (Ernstson et al., 2006; Jorgensen and Gobster, 2010; Hein et al., 2006; Folke, 2002).

Banjarbaru City Government, as both consumer and steward of the environment and its resources, is committed to incorporating the principles of sustainability within its legislature, in order to ensure that the needs of future generations can be met and, at a minimum, provide the same quality of human and environmental well-being. The focus of the present paper is on those initiatives currently being implemented as the city moves toward becoming a sustainable community through the action of urban greening. Banjarbaru's urban green space programme has been designed to encourage community participation and to support building resilience in a sustainable green city.

Banjarbaru's green city programme should be developed strategically in order to prepare the city to face the environmental dangers of urban climate change. In 2011 the city experienced three months of 35 °C air temperatures, while only around 34% of urban inhabitants were supplied by treated water and others were affected by an unreliable and intermittent electricity supply. Long queues of vehicles are a daily occurrence at some petrol stations, evidence of the pressure of rapid urbanisation and overexploitation of natural resources which has spread beyond the city border. Four factors have been identified as being critical to green space management during periods of change and reorganisation: (1) creating value for learning and understanding how to live with change and uncertainty; (2) putting an added value on respecting and combining different types of knowledge for learning; (3) promoting the preservation and nurturing of biodiversity; and (4) creating opportunities and support for self-organisation towards social-ecological

sustainability. This research focused on determining, via interviews, how locals currently understand, respect and support Banjarbaru's city greening programme.

Banjarbaru has previously been recognised as a leading city in national rankings as both a 'Kota Adipura' - a green and clean city, a bicycle city, car-free day city and an arbour city - and for promoting men's health through the 'Gerakan Jantung Sehat' programme. The current condition of the city's green spaces represents a challenge for the management of the green city programme, whose ultimate goal is for Banjarbaru to become the 'Adipura Kencana', the golden green city. Participation, partnership and co-management involving all stakeholders will become key factors if Banjarbaru is to succeed as a sustainable green city.

In this paper we expose how well the nature and purpose of the City Government's urban green space is understood, as well as who the users of this urban green space are and how they may be defined. The objectives of this research were four-fold: to synthesise user opinions regarding existing urban green space conditions, to revitalise urban green space by taking a scientific approach, to create a common understanding of sustainability principles and to promote resilience in an urban setting via the fostering of potential government-stakeholder collaboration.

2. Literature review

Speaking in 2000, the then United Nations Secretary-General Kofi Annan claimed: "We have entered the urban millennium. At their best, cities are engines of growth and incubators of civilization. They are crossroads of ideas, places of great intellectual ferment and innovation. Cities can also be places of exploitation, disease, violent crime, unemployment. We must do more to make our cities safe and liveable places for all. This paper addresses the question of how we can use the ideas and innovations created by city dwellers from all walks of life to address the risks cities face" (Annan, 2000).

As urban ecosystems, cities are dynamic biological-physical-social entities, in which spatial heterogeneity and spatially-localised feedback play a large role. Cities have to develop the capability to absorb the contraction of environmental, social, economic and other aspects of urban life. Urban ecological literature often draws on resilience theory; resilience in urban systems is hypothesised to depend on a city's ability to simultaneously maintain ecosystem and human functions. A resilient social-ecological system, which can buffer a great deal of change or disturbance, is synonymous with ecological, economic and social sustainability. Communities lacking resilience are at high risk of shifting into a qualitatively different, often undesirable state when disaster strikes. Restoring a community to its previous state can be complex, expensive and sometimes even impossible, and thus developing tools, strategies and policies to build resilience before disaster strikes is essential. One of these tools is urban green space development (Alberti, 2008; Pickett and Cadenasso, 2008; Olalla-Tárraga, M., 2006; Alberti et al., 2003; Berkes et al., 2003; Dow, 2000).

People welcome urban green space due to the beneficial services provided, which may vary for each user depending on their interests, culture, ethnicity and religion, as well as on their social and economic background. Urban green spaces can be defined as 'Public and private open spaces in urban areas, primarily

covered by vegetation, which are directly (e.g. by providing areas for active or passive recreation) or indirectly (e.g. by having a positive influence on the urban environment) available for users'. Such areas include parks, cemeteries, family gardens, outdoor sports courts or fields, public gardens, squares, roundabouts, urban trees, urban forests, fallow land, wetland and riparian forest (Zhou et al., 2011; Choumert and Salanie, 2008; Cooper et al., 2006).

From an ecological/environmental perspective, green spaces support sustainable urban development by recycling carbon, absorbing pollutants, providing clean air, soil and water and stabilising urban temperatures and humidity. They also provide habitats for wildlife and can maintain or even improve biodiversity (Krisdianto et al., 2012; Pataki et al., 2006; Hussain et al., 2010; Kaye et al., 2005, Plummer and Shewan, 1992; De Groot, 1994; Hough, 1995; Baycan-Levent and Nijkamp, 2004; Gilbert, 1991; Niemela, 1999; Woolley, 2003).

The social benefits of urban green spaces are also numerous. Scholars have pointed out that well-managed and maintained green spaces contribute to social inclusion and justice, provide cultural links and opportunities for community events, provide an educational resource with regard to the environment and nature, and help improve the physical, psychological and mental health of locals of all ages by providing areas for recreation and exercise. Thus from a social perspective, urban green areas have a significant impact on a wide range of issues ranging from community involvement and empowerment, to matters of safety, inclusion, equality, civic pride, education and recreation (Loukaitou-Sideris, 2004; Nicol and Blake, 2000; Taylor et al., 1998, 2001; Ulrich and Addoms, 1991; Burne, 2001; Ellaway et al., 2001; Takamo et al., 2002, 1995; Ling Wong, 2003; Land Use Consultants, 2004; Frumkin and Louv, 2007).

The use of a socio-ecological system framework could help planners to understand the potential of urban community greening and other civic ecology approaches in building resilience, thus also potentially reducing risk in the face of disaster and conflict. Other methods may focus more on the intersection of ecology and society, involving social capital that is "... a collective asset that grants members "social" credits that can be used as capital to facilitate purposive action". The gaps amongst environmental, economic and social capital can then be bridged in order to create a balance between environmental preservation and demand for development (Glover, 2004; Cilliers, 2009b; Walker et al., 2004; Andersson et al., 2007).

The economy is a wholly owned subsidiary of the environment; a sustainable city recognises that a healthy environment underpins both economic and social well-being. In this context, such a city should attempt to balance these three factors. To accomplish this, the first recommendation in the Green Banjarbaru City Blueprint was to undertake green programmes using an issues-oriented approach, including sustaining urban green space (Cilliers, 2009a).

A city cannot be separated from its ecosystem, which provides both direct and indirect support to city life in the form of ecosystem services. Ecosystem services are those services ecosystems provide that are beneficial for human wellbeing. Although the work of Daily (1997) - in terms of 'nature service' - and Constanza et al. (1997) has popularised the issue and estimated the total global value of such services, their actual integration within urban planning has been slow (Bennett, 2011; Bolund and Hunhammar, 1999; Chiesura, 2004).

Economic value will always be an issue, since many stakeholders' views include questions as to the potential profit which can be made from their investment in developing green cities. Indeed, developing such cities is almost impossible without sufficient financial support. Stakeholders may know little about 'greening', but clearly want to know precisely how much profit they will make (CABE Space, 2009; Farber et al., 2002; Rees, 1998; Voeks and Rahmatian, 2004; CABE Space, 2005).

3. Methods

3.1. Sampling data gathered through interviews

Data was collected in 2010-2011 through the interviewing of 800 selected respondents and the direct observation of different types of urban green space. Interviewees were chosen on the spot based on their observed participation in various activities in urban green spaces, including recreation, exercise, cycling, camping, picnicking and sight-seeing. Most were established to be regular visitors to urban green spaces.

An interview guide was developed in order to obtain the required information based on a combination of open- and closed-ended questions. Interviews were scheduled for between 7.00 to 9.00 am and 3:00 to 6:00 pm, with each lasting for 15 to 30 minutes. Great effort was made to create a friendly atmosphere between interviewer and respondent.

The main topics focused on in the questionnaire involved personal interviewee information, their reasons for visiting the parks, community contribution to the development of the parks and their general opinion regarding related issues. In pre-testing, respondents were questioned as to how they would feel about answering the list of questions. After pre-testing, some questions were modified in order to enhance the workability of the method. To overcome any potential language barrier it was deemed important for the interviews to be conducted face-to-face, while since the qualitative nature of the interview might have proven too long to be held via telephone, no additional interviews were held.

Quantitative data were calculated as a percentage of the total number of respondents, with this information directly analysed by comparing it to that obtained in previous studies presented in the available literature (Krisdianto, 2011).

3.2. Observation of urban parks

Primary data collected from measuring bio-physical factors associated with green space are frequently used to support or counter user opinion, with argument-based data often employed in synthetic analysis in order to develop a concise conclusion. To observe parks in Banjarbaru firsthand, a direct observation method was used which involved visiting 49 city gardens, three parks and one campus green space. Data were collected by interviewing both users and managers, while the identification and counting of vegetation was also carried out, including the recording of green space provision photographically. Site visits to the selected parks were made following a structured observational protocol. The observation variables used in this

research were chosen in order to determine whether the defined planning and management practices were actually reflected in the parks themselves. Variables were selected after consulting relevant literature examining the functioning of ecosystem services within cities (Andrade and Vieira, 2007; Snep et al., 2006; Givoni, 1991).

After ten exploratory visits to different parks, the observational protocol was fully developed, focusing on vegetation structure, information provision, the presence of cultural aspects, and recreation and sport provision. Recreational resources actively planned and provided for by a municipality provide an indication of the latter's view on local recreation in general. As a type of social behaviour, recreational activities are best analysed via observational survey (Bryman, 2008; Yin, 2009).

A variety of different recreational factors were observed, including the presence or absence of benches and tables, sports fields and running tracks, while the presence of informational signs within parks was also noted. In Banjarbaru, children's playgrounds are separate fenced entities within or outside green spaces and were therefore excluded from observations (Freeman, 1999).

The observed vegetation structure was used to calculate habitat diversity, which together with the size of the park may provide a general indication of local biodiversity. These data included species number and abundance, diversity, size, and distribution and evenness of vegetation and avifauna. As vegetation cover frequently overlaps (i.e. tree cover is located above shrubs/grasses), total coverage could be greater than 100% (Pauleit et al., 2005).

3.3. Data analysis

The present study was largely exploratory in character, with no confirmatory or predictive aims set. The main interest driving data analysis was to determine people's thoughts and perceptions in a qualitative manner, rather than to establish quantitative relationships or identify group-dependent variables. While basic descriptive statistics were applied, more attention was paid to the qualitative analysis and interpretation of the data obtained. Nonetheless, the results would provide interesting information for planners and developers regarding the role and importance of public green space for citizens' daily well-being and quality of life (Jellema and de Vries, 2003).

For the purpose of this paper, however, analysis was limited to the following issues:

- 1) User satisfaction with the amount of green areas in cities: Are they aware of the benefits of these areas? Are locals satisfied with the currently available green space?
- 2) Appreciation of nature: How do people express their appreciation of nature and what can be done to enhance this?
- 3) Who are the green space users? What are their genders, ages, occupations, income and level of education?

4. Results and discussion

Respondents clearly understood that the presence of trees in their urban green spaces has multiple advantages, including environmental, economic and social benefits; 67.3% were also aware that trees must be retained in the municipality as renewable resources. The most commonly recognised benefits of trees were the increase in atmospheric air quality (42.0%), a reduction in the negative effects of soil erosion caused by urban runoff and improving surface water quality (60.7%), the conservation of urban biodiversity (37.3%), noise reduction (40.7%) and the creation of buffer zones (38.0%). Public knowledge of the benefit of green space appears to be shared between users, while evidence revealed in much of the literature suggests that the planting of indigenous species can improve both drainage and water usage. Respondents were aware how green spaces can improve urban wildlife, but such areas also act as a sink for various atmospheric pollutants, as well as reducing the urban heat island effect. Properly planted trees can increase shade, act as wind-breaks and provide evapotranspiration which can save residents 2 to 20% in energy costs. Overall, green spaces can enhance our connection with ecological processes. Examples such as the Emerald Necklace in Boston, Massachusetts and the Florida Greenways system have become urban animal refuges, with a variety of species living within areas that urban dwellers would not normally have the pleasure of seeing. Both projects involved collaboration between a number of organisations to create state-wide ecological and recreational/cultural networks. The chains of parkland also provide a large area of water storage that acts as a flood prevention method (Roseland, 2005; Mierzejewska, 2004; Benedict and McMahon, 2006).

It has been argued that environmental interventions such as tree planting programmes make environmentally sound behaviour easier to engage in, that their economic return is more apparent and that they are more effective than public education efforts in changing attitudes. Respondents in the present study agreed that the economic value of urban trees includes increasing property values (36.7%) and reducing energy costs (36.7%). Banjarbaru residents were found to believe that green spaces influence their personal economies by up to 50%. This figure is similar to the results of other studies in the urban planning literature regarding the quantitative analysis of the value of trees, as well as survey evidence suggesting that inner city residents factor in the presence of trees in their residence location decisions. However, little research has been carried out regarding the direct causal impact of greening programmes (Anderson and West, 2006; Anderson, 1985, 1988; Summit, 1997).

Bucchianeri and Wachter, (2007)'s study made use of an in-depth data set containing precise location information of all house sale prices and tree planting in Philadelphia between 1998 and 2003, with the authors exploring how the latter affected the former. In Banjarbaru, the questioned green space users also thought that urban trees may both benefit the city's economy through increasing urban tourism (40.7%) and also improve social health and welfare (53.3%). Recent research in South Africa found that consumers would be willing to pay, on average, a 12% premium for goods purchased in retail establishments enhanced by quality landscaping. Well-planned improvement of public green space within town centres can boost commercial trading by 40% and also generate increased private sector investment (Cilliers, 2010).

Around 68.7% of green space users in Banjarbaru agreed it was very important that trees be present in their settlements, with 36.7% commenting on specific social values such as civic pride, creating a positive aesthetic image, amenities and a tidy environment. These figures should surely encourage the City Government to continue to support the development of green urban spaces in Banjarbaru. However, certain aspects of urban trees concerned users, with issues raised including safety fears (40.3%), potential damage to property (30.0%), as well as high investment and maintenance costs (40.0%). This suggests that every park should be designed and maintained to a high standard if locals are not to be disadvantaged.

Respondents were both generally aware of and welcomed city greening programmes, and agreed that the City Government should disseminate information through as many types of media and events as possible; it was their view that such outlets would help to persuade society to support the development of urban green spaces in Banjarbaru. Television programmes were chosen by 57.3% and newspapers acknowledged by 44.0% of users questioned, while the Internet, exhibitions and city fairs were selected by 46.7%, 38.7% and 43.3%, respectively. Conservation, professional and urban forestry activities were considered useful by 43.3% of respondents, but private consultation and material promotion were judged beneficial to users by only 22.7% and 25.3%. 'Junk' mail and scientific-professional seminars were less popular with youths and young workers, who instead favoured outdoor events such as photographic exhibitions, fun walks, outward bound activities and open air music. Considering these findings, the City Government must therefore develop strategic methods of promoting city greening to the wider society, perhaps involving the use of more flexible ways of orienting target users, since not all have similar preferences with regards to greening programmes (Krisdianto et al., 2011; Johnston and Shimada, 2004).

4.1. Funding green spaces

Such expectation must of course be financially supported by all stakeholders, which in this case would include the national government of Indonesia, the administrative bodies of South Kalimantan and Banjarbaru city, and indeed the Banjarbaru urban community itself. 59% of respondents claimed that the Indonesian government should be responsible for green city budgets, while the provincial and local city governments were also expected by users to provide 50%. The inhabitants of Banjarbaru questioned were willing to provide 50% of such a budget. About 34.0% were willing to pay up to Rp. 30,000 (US\$ 3) (34.0%), 26.0% said they would pay up to Rp. 50,000 (US\$ 5), while just 10.7% were amenable to paying more than Rp. 50,000 (US\$ 5). Around 26.0% stated that they would definitely support green city programmes, while 29.3% were willing to support them and another 3.80% of respondents saw the possibility of them contributing to fundraising. Public willingness to pay for parks has been explored in developed countries (Chen et al., 2006).

Banjarbaru residents appear to be very enthusiastic about financially supporting the city greening programme, but were hesitant to contribute directly using income normally reserved for household expenditure. Interviewees suggested that such money could be officially collected from tax payers, perhaps wanting their contributions to be properly audited by the City Government. Retribution or value added tax (VAT) were suggested as appropriate means of green space fundraising by 29.3% of users, a local property tax by 24.0%, real estate tax by 26.7%, tobacco and alcohol tax by 32.7%, state income tax by 40.0%, state

enterprises tax by 37.3%, institutional and individual donations by 25.3% and any additional fundraising activities by 8.7%. In fact, many parks systems across the world were initially developed based to a considerable extent upon expectations of their direct and indirect economic contributions to city tax revenues (Edwards, 2007)

From an economic perspective, high quality green space can add value to surrounding properties, both commercial and residential, consequently increasing tax returns for local authorities. Moreover, such areas help to create a favourable image of a place, boosting retail sales, attracting tourism and inward investment in the area, encouraging employment and even exerting a pull on skilled labour (Harnik et al., 2009; Luttik, 2000; Kim and Johnson, 2002; Morancho, 2003; Crompton, 2005; Wolf, 2003; Downing, 1999; CABE Space, 2009; Dunnett et al., 2002; Tajima, 2003; Kroeger et al., 2009).

The above figures may be a positive sign that the public are already aware of the role of green space in boosting their economic welfare. The Banjarbaru City Government could build on this situation by adopting the Genuine Progress Indicator (GPI) and Ecological Land-use Complementarity (ELC) concepts as decision tools for local and regional development, as well as to finance the green city programme. GPI measures offer the opportunity to better engage with the public and decision-makers during discussion of economic, social and environmental goals and policies. ELC-structures, on the other hand, accommodate multi-party participation whose members represent areas in which participatory management approaches could be developed. These can thus be managed by different landholders and green-area user groups (e.g. community neighbourhood groups, horticulture clubs, allotment associations, green-keepers, farmers and various government maintenance staff). One such approach is adaptive co-management, which can be tailored to suit specific sites and situations, and involves collaboration with various organisations at different levels in society. Adaptive co-management emphasises learning-by-doing in management, with management objectives treated as 'experiments' from which people can learn by testing and evaluating different management policies. Ecosystem service valuation can provide governments, organisations and private landowners with a way of calculating rates of return on conservation and restoration investment. Banjarbaru City Government may also consider adopting the methods behind a success story in China; here the Green Credit Policy adopted in 2007 involved a multi-faceted approach, combining environmental and economic policies to combat pollution and national resource and energy consumption (Bagstad and Shamminb, 2012; Colding, 2007; Olsson et al., 2004; Folke et al., 2003; Gadgil et al., 2000; Walters, 1986; Schmidt et al., 2011; Aizawa and Yang, 2010).

Those questioned in Banjarbaru were willing to support the city greening programme. However, the City Government must be able to create value for environmental services, precisely calculate environmental benefits, value transferable services and benefits on appropriate currency scales, and account for added value and creative redesign. Failure to attribute correct values may create a monopoly or even lead to the tragedy of common property. In addition, unaccountable governance of donations may possibly encourage crime and corruption, with the latter in particular viewed as a social disaster for communities in Indonesia. The phenomenon is clearly counter-productive, acts against social capital development and must simply be avoided (Fukuyama, 2002; Stulhofer, 2004)

Respondents believed that the City Government should develop a clear policy and issue proper directives to builders in order to sustain urban trees. It was considered essential by 46.7% of those questioned that all new construction projects include green space provision, while 42.0% thought the same for property and public facilities and 32.7% for private yards. These figures should be considered an indication that Banjarbaru City Government appears slow to decide green policy with respect to the implementation and protection of urban green space. Due to rapid urbanisation and population growth, large areas of vegetated land have and are currently being converted into the built environment, with cowboy builders converting vacant green sites without appropriately embedding them into existing urban space and regional planning schemes. Problems such as these may increase as they have done in other countries (Dines et al., 2006).

The number of people and amount of money currently contributing to green space development in Banjarbaru are relatively low compared to those in many developed countries. Public awareness and a willingness to share in the development of community education, a sense of mutual trust and a togetherness culture must be encouraged and consolidated in order to provide social capital that can be used to support sustainable city greening. This could be achieved via methods including interaction between family friends and neighbours, resulting in active social networks and high levels of 'neighbourliness'. Such social capital can potentially produce a system in which positive views of sustainable greening are prevalent, such as those in America; here recognition of the social dimensions of exposure to environmental risk emerged in the 1980s through the work of grassroots community activist movements, in which women were often prominent (Hawe and Shield, 2000; Bowling et al., 2006; Kawachi, 2002; Macintyre et al., 2002; CAFE Space, 2010).

Institutions and networks that foster learning, store knowledge and experience, create flexibility in problem solving and balance power among interest groups, contribute a significant amount to the adaptive capacity of a social system. Given that individuals engaged in urban community greening work, organise and learn together, they also often gain a sense of empowerment and self-efficacy that leads to action and advocacy. Community greening can thus be viewed as an institution or network that can contribute to social learning related to community development and resilience. In Kenya, the political and environmental activist Wangari Maatai established the Green Belt Movement in the late 1970s in order to promote environmental conservation and community development amongst women living in poor rural areas. The social values on which the latter project was based are similar to those of gotong royong, gawi sabumi and kayuh baimbai (working together) which currently prevail in Banjarbaru and Indonesia as a whole (CAFE Space, 2010).

Thus far, we have argued that through creating social and other forms of capital, urban community greening in Banjarbaru could play an important role in fostering diverse, self-organising and adaptive communities - communities that one would expect to demonstrate resilience in the face of disaster. This reasoning is based on examples from Bosnia-Herzegovina, the Middle East and New York, where community greening was used as an intervention strategy specifically designed to promote such resilience. Other examples of the use of greening following disaster include the construction of raised beds to grow traditional foods in mobile home parks following hurricane Katrina, as well as community agriculture projects implemented at refugee camps in order to address environmental, economic and psychological damage following the 2004 tsunami in Sri Lanka and after civil war conflict in Somalia. Interestingly, through

participation in agricultural training programmes, refugees may take home new and more varied agricultural techniques than they possessed knowledge of before displacement, thus fostering adaptive learning more broadly (Tuathail and Loughlin, 2009; Katzman, 2012; Thanawood et al., 2006; Tidball et al., 2010, Tidball and Krasny, 2010; Miller et al., 2009; Gruder, 2008).

4.2. Challenge in social capital

Around 18.0% of those questioned were involved in the planting of trees, with the remaining 82.0% never participating in the activity. With regard to urban tree maintenance, 45.3% claimed to fertilise their trees, around 70.0% were involved in trimming and about 84.0% pruning. Those who knew Banjarbaru to be an 'Adipura City' totalled less than 14.0%, 30.0% were aware of Environmental Day and only 25.3% of respondents knew about climate change and global warming. However, rather more were aware of urban climate change (61.3%), while green open space (34.7%) and urban forest (35.3%) were also acknowledged.

But why were so few of those questioned directly involved in greening programmes? The presented figures reflect the fact that the public were not involved with greening initiatives in Banjarbaru from the outset, with the City Government often promoting a symbolic formal partnership rather than inviting public participation in, for instance, tree planting. It certainly makes more sense for urban dwellers to be directly involved in maintaining the trees in their own neighbourhoods, considering the City Government's lack of funds allocated for such activities. With each community neighbourhood working together ('gotong royong'), every individual or group could finance their own activities, with the government providing only that needed for the programme to be a success.

City officials must also not overlook the fact that the public appear to be mostly unaware of the concept of 'Adipura' - the most significant planning target associated with greening in Banjarbaru - with the figure of around 14% much lower than expected. Surprisingly, rather more (around one third of respondents) knew about green open spaces, climate change, Environmental Day and urban forests. These figures clearly send a message that the City Government must take action to disseminate more information and encourage wider community participation in the project, especially since the latter allows green space practitioners and the public to appreciate each other's difficulties and needs. However, involving the public may require the development model to be modified, while the design process may have to involve a redefinition of priorities, the creation of improved forms of participation and communication, as well as a shift in the mindsets and working patterns of participating professionals. Urban communities have a particular skill set and must be included in the process of green planning and urban development (Speller and Ravenscroft, 2005; Cole et al., 2008; Pennsylvania Horticultural Society, 2007).

The City Government must therefore take action to initiate a partnership with locals, since those questioned revealed themselves to be little involved in planting trees in public places (25.3%). Some respondents were keen to actively participate in local education programmes regarding city greening (24.0%), while others said they would be involved in increasing support for city greening plans (34.7%) or raising community awareness of tree care and planting activities (29.3%). These figures clearly reveal the potential for social capital improvement in Banjarbaru, which could potentially revitalise city greening

programmes if it is clear what the benefits will be, as Pincetl and Gearin (2005) discovered in their study of urban green space in Los Angeles.

4.3. Who are the green space users?

Users of green open space in the city of Banjarbaru appear to be mostly educated, with a large proportion graduates (50.0%) or having completed secondary education (39.3%). Most work in the private sector (52%) or for government bodies (21.3%), while their annual household incomes range from US \$ 1,200 to US \$ 6,000, with a large number around US \$ 2,000 (38.0%) or US \$3,600 (31.3%). Most users live in households of four or five, comprising a father, mother and two (27.3%) or three (22.7%) children. One or two of these children may be more than 18 years old. However, 12.7% of families consisted of 10 people or more. These figures clearly reveal that green space is essential in order to accommodate the daily activities of family members. Since youths need the opportunity to meet their peers, green spaces may be reasonable locations to do so since their family incomes are relatively low and thus cannot finance travel far from home. In fact, public green spaces are possibly the only reasonable sites for those on low incomes at which they can benefit from outdoor recreation, sports and social interaction (Maas et al., 2006; Alberti, 2005)

In general, people of all ages and cultural backgrounds prefer natural views to those of the built environment. Trees in particular are thought to improve public judgment of the visual quality of cities, and as such are highly valued elements of urban neighbourhoods. Green spaces in Banjarbaru also provide the opportunity to increase cohesiveness and gender equality for both locals and migrants. Most users questioned (72.0%) were Banjarese, with the remaining 28% belonging to other ethnicities such as Javanese, Sumatran, Makassar or other Indonesian islands. Men comprised 56.7%, with most 18 to 30 years old (69.3%) or in middle age (31 – 45 years old; 18.0%). A large proportion of respondents lived in rented accommodation (41.3%), with most of these being university students, young workers or temporary residents. Permanent residents and locals questioned tended to reside in houses worth less than US \$ 5,000 (15.3%), while others were priced at around US \$ 10,000 (20.7%) and US \$ 50,000 (20.7%). The above figures can be seen as a response to the scepticism of Portney (2005), since they represent a very promising potential source of social capital that could be improved in order to both promote the resilience of Banjarbaru and improve the lives of urban dwellers themselves (Wolf, 2008; Dwyer et al., 1994; Smardon, 1988; Ulrich, 1986).

By creating opportunities for more activities to take place in urban green spaces, the City Government can increase social capital in Banjarbaru, bringing communities together and improving social cohesion between people of different economic status, age, ethnic origin and personal tastes. In the present study, local parks were by far the most likely green spaces to be known about and used by those questioned. However, better quality parks tend to attract a higher proportion of visitors even if they are more distant; these green spaces contain good facilities, are well-maintained and are easily accessible by public transport for a range of people with different needs (Laing, 2005).

In Banjarbaru, the most commonly-reported crimes are related to traffic accidents, with theft and violent crime less frequent. This may reflect community greening activities bringing people together in such a way as

to combat crime and that through socialising, greater bonds of trust can be developed between community members, reducing fear and class segregation. Such ideas have significant consequences for communities and it is thus especially important to teach children how to interact; youths must meet their peers in surroundings that are accessible to members of all communities, without formal, financial or symbolic restrictions. This is why it is important to see communities as a collective; no single group should ever be or feel alienated. However, while encouraging greater participation of marginalised groups should not be carried out without considering power relations between and within groups, it does not automatically safeguard values of equality, nor should it be presumed to do so. The challenge is for policy-makers to be aware of the specific as well as the broader impacts of their actions. Green spaces usually promote interaction among users that extends to the building of social capital, enhancing a local sense of community and a sense of accomplishment (Krisdianto et al., 2011; Stoecker, 2005; The trust for Public Land, 2004).

Urban community awareness can be improved through participation in projects aimed at creating green space in cities, such as community and living memorial gardens, forests, city parks and botanic gardens. Soweto for example, once a scene of rampant sectarian violence during apartheid, has today both a vibrant garden and outdoor 'community centre'. After 9/11, many community gardens became both living memorial gardens in which to grieve and a unifying, community-building demonstration of solidarity and support, all of which can contribute to social resilience and improve reactions to any future disaster. The community garden movement in North America can also be viewed as a community-based response to urban crime and decay. Greening in general enhances mental, physical and community health, while the creation of urban green spaces in particular can build natural, human, social, financial and physical capital in unique ways, which may have important implications for building resilience prior to and following disaster or conflict. Community spirit is also fostered when garden and tree planting projects are combined with job training schemes, with neighbourhood employment increasing, skills gained and the environment improved. Finally, neighbourhood parks and recreation grounds promote a sense of community by providing a convenient and attractive public place in which neighbours - both adults and children - can meet and interact (Wolf, 2008; Finney and Rishbeth, 2006; Stringer et al., 2006; Haq, 2011).

Although participation does not represent a panacea for embedded racial and ethnic inequalities, which are often deeply interwoven into the fabric of society, there is potential for groups involved to feel that they are listened to by planners. In Banjarbaru, green planning schemes have made an important contribution in exposing power relationships in society and arguing for more inclusionary processes. So what then remains to be done in the city? We contend that the next step is for policy makers and researchers to work to formally integrate urban community greening into adaptive co-management strategies aimed at building communities that are both resilient prior to and able to recover after disaster (Viljoen and Bohn, 2009).

In this paper we have argued that urban community greening and other 'civic ecology' approaches - those that integrate natural, human, social, financial and physical capital in cities, and that also encompass diversity, self-organisation and adaptive learning and management resulting in the creation of positive feedback loops - have the potential to benefit the city of Banjarbaru by helping communities to develop resilience before and after disaster. We realise that an emphasis on community greening may be counter-intuitive, given that many urban residents have unmet fundamental needs. However, we contend that some individuals and

communities take it upon themselves to improve their environment even under the most difficult conditions, and that such action is not only a part of resilience but should also be incorporated into asset-based development and educational schemes in the future, as Abegunde (2011) found in Nigeria.

Community greening can serve as the focus of future adaptive co-management, social learning and research into urban resilience. We have discussed here how urban community greening not only builds multiple forms of potential capital in ways that are distinctly different from other types of greening projects, but how it also contributes to diversity, self-organisation and adaptive learning and thus provides the conditions necessary for resilience in a socio-ecological system. This advice fits well with many of the ideas outlined by urban ecologists; as the city is an integrated system comprising both natural and human dimensions, its management should involve the cooperation of a variety of stakeholders. In the future, we hope to integrate resilience theory and urban community greening with other socio-ecological, participatory and asset-based approaches in order to build resilience in Banjarbaru, following the methods of those city greening success stories observed in many other developed countries (Redman et al., 2004; Carmona, 2003).

5. Conclusion and implementation

Users of urban green space in Banjarbaru suggested that every resident should have at least one private tree, where ever this may be grown, and that these trees must have multiple benefits, such as fruit production, shelter or other ecological, economic and social values. This suggestion should encourage and inspire the City Government to develop strategies of improving urban resilience in many different areas, including the environment, food, water, energy and the use of resources. Such projects should involve increasing the density, biodiversity and area of green space associated with streets, squares, schools and other public sites; parks would be achievable as short-term objectives. The value of these green spaces could be further strengthened by the planting of a variety of appropriate species, as well as being engineered into the city's wider development plans.

The City Administration's aim should be to create added value for urban ecosystem services, promoting them to increase citizen appreciation of and participation in current city greening programmes. Conservation and improvement of existing green spaces and the development of a wider variety of associated land uses would be suitable main policies for middle- and long-term social capital improvement at the whole city scale, with the development of more creative and effective solutions considered for the improvement of city regions.

It should be possible for Banjarbaru to convert this challenge into an opportunity, accommodating ecosystem services and potential social capital within sustainable green development by improving participation, co-management and partnership in increasing the quantity, quality and accessibility of green space. Planners and developers must be actively involved through compulsorily providing space and growing trees in their housing areas, while the City Government should compel its subordinate departments, as well as the boards and principals of schools and universities, to develop green spaces containing ornamental and

shade trees. The conservation and development of such green areas will then transform Banjarbaru into being a more liveable and resilient city.

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