



Original research article

Application of capability approach to assess the role of ecosystem services in the well-being of Indigenous Australians



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ARTICLE INFO

Article history:

Received 14 July 2015

Received in revised form 4 September 2015

Accepted 4 September 2015

Available online 25 September 2015

Keywords:

Indigenous well-being

Natural resources

Ecosystem services

Capability approach

Well-being policies

ABSTRACT

The well-being of Indigenous people in Australia and throughout the world is linked to the use and value of natural resources. This research analyses the current well-being approach applied to measure well-being of Indigenous Australians. It reports findings from three case studies in Queensland on Indigenous people's values and concerns and their capabilities in relation to natural systems. It applies a holistic approach based upon the Millennium Ecosystem Assessment and Sen's capability approaches and proposes an integrated well-being model by incorporating intangible values such as cultural and identity values, that are linked to people's capabilities involving natural systems. It provides a novel way of understanding the role of natural resources in Indigenous well-being by associating natural resources with people's capabilities. The study suggests transforming the present concept of well-being and its measures for incorporating people's capabilities that can effectively inform future policy decision making.

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1. Introduction

In Australia, current Indigenous well-being measures fail to incorporate nature-related attributes, despite recognition that many Indigenous communities are well connected to natural resources for various aspects of people's living.

A significant literature suggest Indigenous social, spiritual and cultural connections with nature (for example, Aboriginal communities of the Northern Territory by Altman, 1987, 2004; Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS), 1994; Bunya Mountains Elders Council and Burnett Mary Regional Group, 2010; Dodson, 1997, 2010; Dodson and McCarthy, 2005; Kaur, 2006, 2007; Keen, 2004; National Native Title Tribunal, 2012; Panelli and Tipa, 2009; Queensland Murray Darling Committee, 2008–2011; Sangha et al., 2011, 2015; Wet tropics Aboriginal Plan Project Team, 2005 and many others). Indigenous closeness with nature is evident from the intricate relationships between people's physical, spiritual and human worlds (Fig. 1; Sangha et al., 2015) and from the values that they have for their traditional system of bush food, rituals, totems and the kinship system that involved responsibility to care about different components

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of nature. In more recent times, some Indigenous people may not be fortunate to live on their land; however, about 72% of Australia's Indigenous population is still connected with land (country) for their traditions, culture and identity (Australian Bureau of Statistics (ABS) 2009–2010 and 2012).

Land is of paramount significance for Indigenous people and it defines their identity for the present and future generations. Traditions, history and relationships with sites are passed from one generation to another, and are considered vital in the well-being of an Indigenous society (Rose, 1995). Dodson (1997) states *“our traditional relationship to land is profoundly spiritual... it provided our ceremonial objects, sacred for people, ... the sacred names, the kinship, the subsections, the homelands, and whatever language you might speak”* demonstrating that connections to land are central for the well-being of Indigenous communities. Many aspects of socio-economic living of Indigenous people fundamentally depend upon natural systems for the provision of various services (Altman, 2004, 2006; Altman et al., 2005, 2011; Sangha et al., 2011).

According to 2011 census, the Indigenous population represents 2.5% of total Australian population (548,369; ABS, 2012–13). However, there is no appropriate framework to measure well-being of Indigenous people that includes people's connections with land. As highlighted by Taylor (2008) and Grieves (2007, 2009), there is a need to recognize and interpret the elements of well-being that Indigenous people value and practice, which are beyond the general framework currently applied by the ABS (The Australian Bureau of Statistics) (2001) (which has little inclusion of indigenous connections with country).

Lack of an appropriate well-being framework and its measures further lead to in-effective and inappropriate welfare policies that contribute towards lower levels of Indigenous well-being (McCubbin et al., 2013; ABS, 2012, 2012–13 and many other such reports). For example, life expectancy at birth of Indigenous males is 69.1 years and females is 73.7 years which is about 11 years less compared to the non-Indigenous population (ABS, 2013). For education, Indigenous students are significantly behind the non-Indigenous students: Year 12 or equivalent education achievement rate is only 22% for Indigenous students compared to 54% for non-Indigenous students (in 2008; ABS, 2012). Similarly, there are many issues related to domestic violence, alcohol abuse and caring for children (Australian Institute of Health and Welfare (AIHW), 2011, 2013a,b).

This paper explores what well-being means for Indigenous Australians. It examines the current well-being framework, people's links with the natural systems, and proposes an integrated model based upon empirical data from three case studies in Queensland. It explores the application of the capability approach (Sen, 1985, 1993, 1999a,b) to include people's links with nature as ‘functionings’ (i.e. people ‘can do’) into the well-being measures. The proposed integrated approach to well-being including people's values and capabilities in relation to natural resources is relatively new to the current Australian well-being approach. This research can help to develop appropriate well-being measures and welfare policies for Indigenous people in Australia as well as worldwide, in the future.

2. Indigenous well-being concepts and issues

In Australia, the well-being concept is presently applied from a western perspective as it was initially developed for non-Indigenous Australians and ignores many values that Indigenous people value in their well-being (McCubbin et al., 2013; Davidoff and Duhs, 2008; Garnett et al., 2008; Grieves, 2007, 2009). The Australian Bureau of Statistics (ABS, 2001) defines well-being as ‘a state of health or sufficiency in all aspects of life’. The OECD (Organisation for Economic Co-operation and Development, OECD, 2011) identifies that there is no single definition of human well-being because the term includes several facets with complex interactions and the respective importance of each aspect is difficult to identify. Despite this, globally, there is a basic agreement that “well-being” includes the satisfactions of material needs, the experience of freedom, health, personal security, good social relations and healthy natural environment (Alkire, 2002; Sen, 1993, 1999a).

The non-Indigenous value system is different to the Indigenous value system where commodities or utilities matter to a greater extent (Edwards, 1988; Grieves, 2009). The current socio-economic framework, applied by the ABS (2001) is consistent with the utility values and is primarily meant to measure well-being in relation to use of various commodities as reflected from attributes such as economic resources, income, housing etc. These measures may suit non-Indigenous people but their suitability for Indigenous people is questionable. In contrast, well-being of Indigenous people is well embedded with the natural systems (Dodson, 1997, 2010). The problem in the modern economics is how to deal with the non-monetary aspects of well-being such as cultural, identity and spiritual values or the traditional knowledge that people may have. In addition to nature related values, Indigenous people's skills and knowledge are well linked with the use of natural resources, but these are not incorporated into current well-being measures. So, how to incorporate nature related values into Indigenous well-being?

The ABS Indigenous Policy and Engagement Group (ABS, 2010) developed a framework for Indigenous Australians that represented interactions of Indigenous people with their socio-cultural and economic environments. It focuses on social and cultural aspects to a greater extent than the natural aspects (in comparison to the ABS 2001 socio-economic well-being framework). However, it fails to include the depth of relationships that Indigenous people have with their natural environment/country. To date, this framework has been applied only for the Aboriginal and Torres Strait Islander children and youth (ABS, 2012) and the main messages from culture, heritage and leisure domain (where it is expected to highlight people's connections with nature) were: 49% identified with a cultural group, such as a clan, tribal or language group; 52% recognized an area as their homeland or traditional country; 8% spoke an Indigenous language as their main language at home; 65% had attended a cultural event in the last year; and, 25% of all Indigenous youth were living in their homelands.

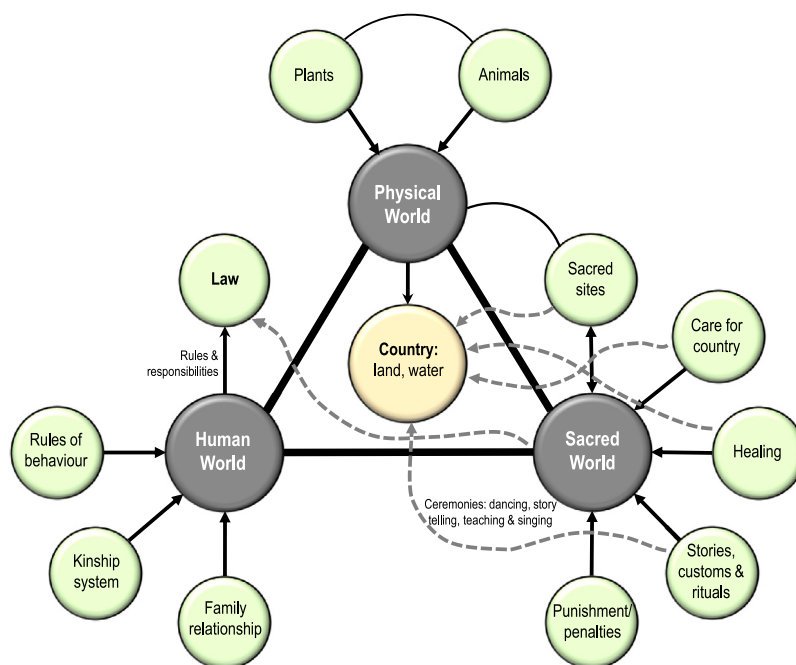


Fig. 1. Conceptual model of Indigenous people's connections with nature: country (including land and water resources) plays a central role in the physical, human and sacred worlds of Indigenous people. Dashed lines represent significant connections contributing to the Indigenous people's view of 'country'. Source: Adapted from Sangha et al. (2015).

There are many drawbacks in the [ABS \(2010\)](#) framework as it does not include how well-being of Indigenous people is related to use or value of natural resources, what kind of connections exist between people and land (its access and security) or what capabilities people derive from their country. This framework also fails to explain how people connect to their homeland/country or how their capabilities may contribute towards their well-being.

To evaluate people's connections with natural resources, we integrate two different approaches, i.e. a capability approach by [Sen \(1999a,b\)](#) on social systems, and a Millennium Assessment (MA) approach on socio-ecological systems, to suggest a hybrid socio-economic-ecological approach, as mentioned below.

[Sen \(1985, 1993, 1999a,b\)](#) discussed the failures of modern economic approaches to well-being for not reflecting people's values i.e. functionings and capabilities. Sen's functionings mean 'doings and beings' of people and providing them freedom and opportunities to lead creative and healthy lives. Capabilities are the possibilities /freedoms, in simple words—a combination of functionings that a person can achieve, reflecting a person's freedom to lead his/her life. It is about making use of, and/or valuing a resource or commodity in contrast to just affording a resource or commodity, as previously thought in the well-being and development economics ([Sen, 1999a](#)). For example, knowledge of bush food and the ability to gain and pass on this knowledge is a capability, and to be able to access land to apply bush food knowledge for use is a functioning. [Sen \(1999b\)](#) also emphasized the need for new methods to value or incorporate capabilities into well-being measures so as to accurately reflect people's well-being. In this study, we apply Sen's capability approach ([Sen, 1993](#)) in terms of people's 'functionings' for application of knowledge, social activities, lores and language, kinship systems, identity and spiritual values in relation to nature. Based upon Sen's capability approach, [Sangha et al. \(2015\)](#) proposed an integrated framework for Indigenous well-being, that is applied in the current study.

To address the importance of natural system and their services i.e. ecosystem services (ES) in human well-being, the United Nations commenced a Millennium Ecosystem Assessment (MA) program in 2001 ([MA, 2003, 2005](#)) that particularly emphasized the inclusion of non-monetary ES. The importance of natural systems in various constituents of well-being such as in health, basic materials for living, and in social relations is well acknowledged in the MA studies ([MA, 2005](#)). The MA team in 2003 proposed a framework that links the ES to the well-being of people. However, to date, the MA framework has largely been applied in the ecological studies to assess the status of ES ([MA, 2005](#)).

To appropriately address Indigenous well-being, we should include people's capabilities and nature related values. We apply the ES-well-being concept as proposed in [MA \(2003\)](#), from an Indigenous perspective and extend it to incorporate people's capabilities that are equally linked to use and values of natural resources, by applying Sen's capability approach. For example, Indigenous people have traditional knowledge on how to use various plants in their regional areas that directly enhance their health and overall well-being. An integrated framework (proposed by [Sangha et al. \(2015\)](#) in an earlier issue of this journal), including various social, cultural and economic values in relation to natural systems that people value for their living is applied in here.

We provide evidence from three case studies in Queensland where Indigenous people demonstrated explicit connections with natural resources. We examine and extend people's values in terms of how these connections contribute to people's capabilities and their well-being. This study particularly highlights the importance of natural resources in terms of people's capabilities for providing them opportunities to practice and develop knowledge and skills, thus enhancing their 'functionings'. For this, an integrated well-being framework is applied using socio-economic and ecological attributes, as proposed by Sangha et al. (2015). We also briefly discuss the current Governmental policies on welfare, and suggest a holistic approach towards Indigenous well-being where people could have opportunities to utilize and enhance their capabilities to lead creative and healthy lives (not just to meet the materialistic needs). This can help to transform the present well-being concept and its measures by incorporating the values of natural resources and traditional knowledge systems as valuable 'functionings' of people that contribute to enhance well-being.

3. Study approach

This paper reviews and analyses results from three case studies across Queensland, Australia (Fig. 2) in which Indigenous people have expressed their values and concerns for the natural systems: the Bunya Mountains (The Bunya Mountains Elders Council and Burnett Mary Regional Group, 2010), the Queensland Murray Darling Catchment study by the Queensland Murray Darling Committee (QMDC, 2008–2011), and north Queensland Wet Tropics study (Sangha et al., 2011). These case studies were conducted in participation with the Indigenous people, and the results, in the form of reports and research papers, have already been communicated to the respective communities and wider public. Each of these projects were conducted over more than two years. The indigenous communities in the Bunya Mountains and Queensland Murray Darling catchment were approached through the Indigenous engagement officers based at the Natural Resource Management agencies (NRM bodies), and through an Aboriginal Rainforest Corporation in the Wet Tropics. A few preliminary meetings were conducted with each of the community before discussing the topics of research interest. The Bunya Mountain and the Queensland Murray Darling catchment studies had a prime focus on NRM related issues while the Wet Tropics study was mainly focused on linking people's well-being to natural resources. Thereby, the NRM studies commenced with how Indigenous people would like to manage their natural resources which further relates to their value systems, while the Wet Tropics study started with what well-being means to people and how rainforests play a role in people's well-being. The details of methods followed to study people's connections to nature are mentioned in the respective reports as mentioned above.

The Bunya Mountains Elders Council and Burnett Mary Regional Group (2010) reported a detailed Aboriginal Aspirations and Caring for Country plan that has been prepared mainly by the Bunya Mountains Aboriginal people 'Booburrgan Ngmmunge' by conducting several group meetings. The Bunya Mountains are located in south-east Queensland with a total area of about 100 km² and contain the largest natural Bunya pine (*Araucaria bidwillii*) forest in the world that is famous for its unique natural features of flora and fauna. There are three main Traditional custodians i.e. Wakka Wakka, Jarowair and Barrungam people in the Bunya Mountains area.

The QMDC conducted a study with the Indigenous participants in south-west Queensland in the Queensland Murray Darling Catchment (QMDC, 2008–2011). The QMDC area is 101,177 km² with eight Traditional groups (i.e. Barunggam, Bidjara, Bigambul, Gunggari, Kambuwal, Kamilaroi/Goomeroi, Kooma and Mandandanji). There were three community workshops held for the natural resource management plan where Indigenous people reported their values for various components of the landscape including rivers, woodlands and waterways.

Another study was conducted in north Queensland by Sangha et al. (2011) as a part of a research project (funded by the Commonwealth Scientific and Industrial Research Organization, Australia) to evaluate the role of tropical rainforests in the well-being of Indigenous people living in the area. The Mullunburra-Yidinji clan (40 people) participated in the focus group meetings (conducted three times in a year) to assess the value of tropical rainforests in people's well-being. The Mullunburra clan area (Fig. 2) lies within The Wet Tropics World Heritage area which is recognized as the largest tropical rainforest representing a series of living cultural landscapes that were the homelands of rainforest Indigenous people (the Wet Tropics Management Authority, WTMA, 1998). There are a total of 18 tribal groups representing around 50 clans in the Wet Tropics World Heritage Area (total area approximately 9000 km²).

4. Results: case studies

4.1. Indigenous values in relation to the natural systems in Queensland

The Bunya Mountains support the Bunya pine—*A. bidwillii*, called as 'mothers breasts' for feeding people, which is an important source of food for the Indigenous people. The triennial Bunya festival at the Bunya Mountains remained a major event in the past where people as far south as Adelaide came for celebrations, ceremonies and to develop lores (legal system) and languages. The Bunya Mountains were considered as 'Aboriginal Parliament' (The Bunya Mountains Elders Council and Burnett Mary Regional Group, 2010). The other important components of the Bunya landscape were cultural and sacred sites, and various plants and animals such as night owl, bush turkey, etc. that were used for totems, cultural identity and medicinal values (Table 1).

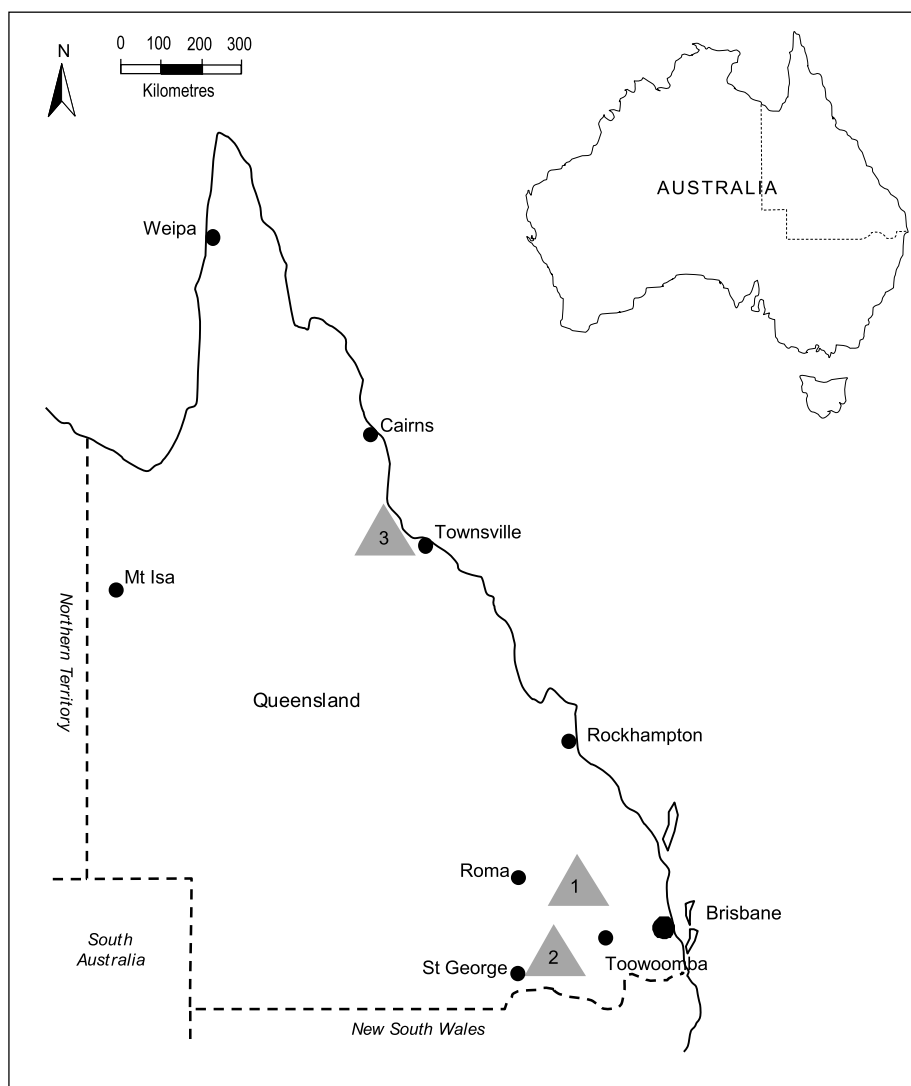


Fig. 2. Location of three case study sites: 1. The Bunya Mountains; 2. The QMDC region; and, 3. The Mullunburra-Yidinji clan area.

The QMDC region supports woodlands, river ways and open grasslands that were valuable for people for provision of fish, bush food and medicine, for sacred and burial sites (Table 1). People considered themselves sick if their waterways were not in a good condition i.e. contaminated with weeds or pests (pers. communications with the elders during focus group meetings, May–September, 2014).

The Mullunburra-Yidinji people valued the tropical rainforest for provision of bush food and medicine, and for healing, sacred and burial sites. People's lives, customs and beliefs are intricately linked with the plants, animals, waterways and seasons of the tropical rainforests which provided food, shelter, medicine and other numerous services (WTMA, 1998). People also valued their natural systems for spiritual connections, socialization and for art and craft (Table 1).

Traditional knowledge and spiritual connections were the common values expressed in all the three case studies (Table 1). The Bunya Mountains people and the Mullunburra-Yidinji people held many cultural values for their respective landscape in terms of provision of art and craft, ability to socialize and to develop language and lores, whereas, the Traditional custodians in the QMDC region emphasized the values of water ways in their living, given that this region is relatively dry compared to the Bunya and tropical rainforests (Table 1).

In all the three case studies, people raised concerns regarding their loss of traditional knowledge, ability to pass on knowledge, and lack of access to land and water bodies (Table 1). The Bunya and Mullunburra-Yidinji people also expressed their concerns to access cultural sites and about the security for provision of services (cultural sites, bush food and medicine etc.) in the future (Table 1).

In addition to these values, individual people's views were selected for their relevance to this study and are presented as below:

Table 1

Indigenous people's values and concerns in relation to their natural systems.

	The Bunya Mountains 'Booburrgan Ngmmunge' are valuable for:	The QMDC region is valuable for:	The Mullunburra-Yidindji Clan area is valuable for:
Ecosystem	Temperate Rainforest	Woodlands (river ways and open country)	Tropical Rainforest
People's values	<ul style="list-style-type: none"> • Cultural heritage site as Triennial Bunya festival was a major festival for the Indigenous people to celebrate and share food, medicine and other items • Cultural practices to develop lores, beliefs, way of life, symbols, language etc. • Served as 'Triennial Parliament' to set up legal system where laws were made and the future of Aboriginal nation was discussed • Connectedness among people from south, north and central parts of Australia who attended the festival • Spiritual connections for emotional and spiritual well-being • Provision of food and medicine such as Bunya nuts and other plants • Traditional knowledge to keep the Indigenous culture alive • Provision of burial grounds and sacred places • Provision of art and craft related knowledge, materials and trade • Cultural pathways that exist in the surrounding landscape to guide the way to Bunya mountains 	<ul style="list-style-type: none"> • Traditional medicine and food • Wetlands as a symbol of fertility of the country, and water ways considered as the arteries of the landscape • Songlines for representing connection to country and stories of creation • Lores (laws) to monitor and regulate the landscape • Provision of culturally important sacred, ceremonial and burial sites • Spiritual connections to the country 	<ul style="list-style-type: none"> • Provision of bush food and medicine • Socialization through various collective activities such as art, hunting, food gathering, and community events • Traditional knowledge about the culture and cultural practices • Sacred, ceremonial and burial sites throughout the rainforest landscape • Provision of materials for art and craft, paint etc. • Spiritual connections for dreaming stories and initiation ceremonies • Provision of healing and sacred places, walking trails, water holes etc. • Provision of places to develop language • Providing a sense of identity for people in the area
People's concerns	<ul style="list-style-type: none"> • Ownership of land and access to land • Access to various cultural sites to maintain the country • Loss of traditional knowledge and to pass it on to future generations • Security for the provision of services • Lack of opportunities to practice traditional knowledge 	<ul style="list-style-type: none"> • Lack of access to rivers and country to manage, and to practice traditional values • Degradation of natural resources in the region such as decline in river health and fish species, and clearing of native vegetation • Loss of biodiversity • Construction of dams and weirs • Loss of traditional medicine and food (and traditional knowledge) 	<ul style="list-style-type: none"> • Access and security of cultural sites • Loss of traditional knowledge and to pass it on to the next generation • Lack of opportunities to practice cultural values • Losing Identity and sense of belongingness to the sites • Loss of spiritual values • Loss of freedom to access many cultural sites in the Wet Tropics area

The Indigenous people in the Bunya mountain area “...*The Bunya Mountains means a lot to me because you know this is where we learn about sharing and caring about others in Queensland, not only in Queensland but in different states because of the Bunya festival...*” Aunty Beryl Gambrell (WakkaWakka Elder cited in the [Bunya Mountains Elders Council and Burnett Mary Regional Group, 2010](#)).

“*We are Booburrgan Ngmmunge and Booburrgan Ngmmunge (Bunya Mountains) is within us—the Aboriginal people with connections to her. The two are intrinsically and symbiotically connected. The health and wellbeing of Booburrgan Ngmmunge and Aboriginal people are therefore dependent on each other*”—The [Bunya Mountains Elders Council and Burnett Mary Regional Group \(2010\)](#).

“*Aboriginal people tread softly upon the Earth with the greatest of respect. Their unseen creation of vibrations reverberates throughout the land, creating a spirit force that is captured in, on, around, under, over and through the landscape*”. Carmel Knox, Goomeroi; and Uncle Joe Turnbull added, “*we need to have places we can go, to teach and pass on culture to the children*” (cited in the [QMDC, 2008–2011](#)).

The Mullunburra-Yidindji elders said, “*when on country, we could dream*”, “...*when I go on country, I remember things and people, I feel connected and happy*” (cited in [Sangha et al., 2011](#)).

In all the meetings, people expressed their intimate relationships with their country for spiritual, emotional and health benefits that further links to their overall well-being.

As a snapshot of people's values, the participants were asked to express their views on three different perspectives of well-being as shown in [Fig. 3](#) in recent focus group meetings with the QMDC elders (May–September, 2014; there are three meetings, each involving 12–15 participants). There were options to choose the current socio-economic view (having a house, car, etc.), the traditional view (bush food and medicine, cultural practices, etc.), and a mix of these two approaches. Invariably, all the participants chose the mix of two approaches, with a greater emphasis on the traditional view of well-being that represented people's connections to the country ([Fig. 3](#)). The participants particularly mentioned that the traditional view



Fig. 3. Indigenous well-being pathways i.e. 'modern style' with commodities, 'traditional style' with access to land or a mix of two approaches, as suggested by elders in the Queensland Murray-Darling (focus groups 2014). Indigenous participants invariably opted for the traditional and/or mixed style.

is a critical component. One of the participant said *'the kind of peace and satisfaction I get when I am on my country, is nowhere ever else'*. The traditional view of well-being (being close to nature) in Fig. 3 actually re-enforces people's closeness with their country, despite their experiences of western lifestyle, and availability of modern commodities.

People's values and concerns are further discussed below in the context of well-being (ES-well-being links), applying the MA approach.

4.2. A proposed framework to link indigenous values and well-being

The MA framework (MA, 2003) is particularly valuable from Indigenous perspectives for including many values that are non-monetary, and are important in Indigenous well-being. Based upon this concept, we developed a matrix of ES and their role in the socio-economic constituents of well-being, as presented in Table 2. This matrix can be extended to understand every link between well-being constituents and the services that people obtain from their natural systems, as in Fig. 4. These links are also expected to vary depending upon the type and status of an ecosystem and people's knowledge, as also evident in the three case studies where people from the QMDC region emphasized the waterways, whereas the Bunya Mountains and the Mullunburra-Yidinji people emphasized cultural sites and traditional knowledge. In addition, these links will also vary depending upon people's freedom (rights) and their choice to use the resources.

Based upon people's links with natural systems, we applied a model (Fig. 5; developed by Sangha et al., 2015) highlighting people's cultural, social and economic connections with the ecosystems through a two-way relationship. In this model, ecosystems provide services to people and people are responsible to look after their ecosystems (country). This model suggests a direct relationship between people and country for various socio-economic and ecological values, and provides a foundation for the integrated well-being framework. To do this, we extend the MA framework to incorporate people's capabilities that are vital for enhancing Indigenous well-being by applying Sen's capability approach (Sen, 1999a,b) (next section), given that people can have opportunities to utilize and develop their skills and knowledge in relation to the natural resources.

4.3. Capability analysis of people's values and capabilities from three case studies

This section extends people's values of natural resources in terms of capabilities (Table 3) determined in the three case studies mentioned above. People's capabilities in terms of their traditional knowledge, ability to practice cultural traditions, ability to socialize and to perform art and craft related activities, and to pass on knowledge systems to the next generations, are well connected to natural resources (Table 3). The Mullunburra-Yidinji people particularly mentioned the role of activities such as hunting, painting and food gathering in enabling them to lead their creative lives. The Bunya Mountains, the QMDC region and the tropical rainforests (Mullunburra-Yidinji clan area) potentially provide opportunities

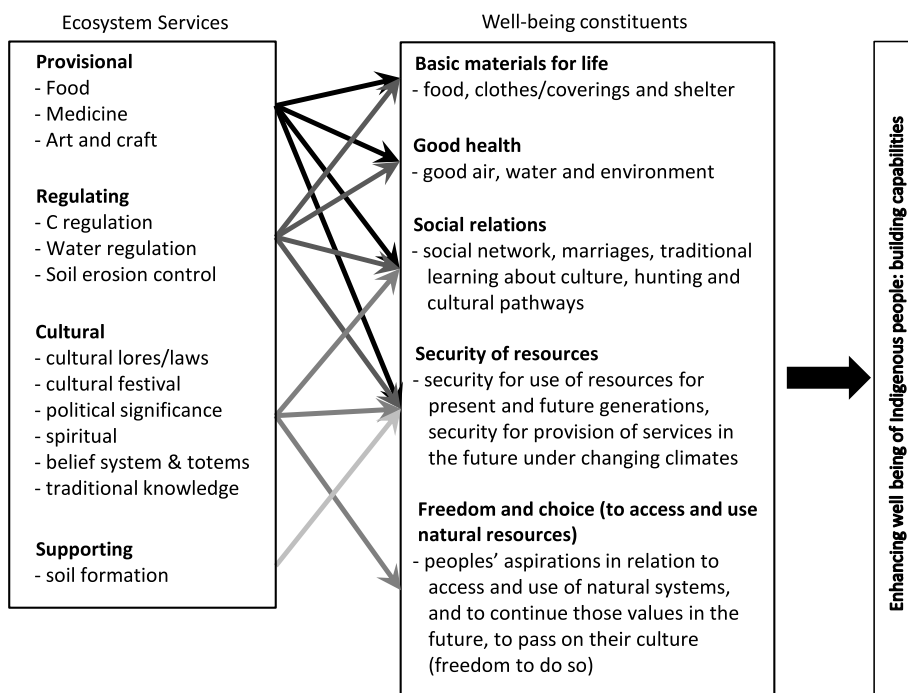


Fig. 4. A simplified socio-economic-ecological framework (based upon the data from the case studies, following the MA framework) suggesting links between natural resources and well-being (the strength of each connection will vary depending upon people and the state of an ecosystem).

Table 2

A matrix of ES and well-being of Indigenous people (based upon case studies).

Ecosystem services	Well-being constituents					ABS socio-economic attributes
	Basic materials for life	Good health	Social relations	Security of resources	Freedom and choice	
Food	X [#]	X	X			§ [#]
Medicine	X	X	X			§
Cultural art and craft materials			X	X*		
Cultural values and practices			X	X*	X*	
Cultural sites			X	X*	X*	
Cultural festivals (Bunya or seasonal festivals)	X	X	X	X*	X*	§
Political significance			X	X*	X*	§
Cultural lores and languages			X	X*	X*	
Burial/ceremonial grounds			X	X*		
Belief system and totems			X	X*	X*	
Social connections: hunting, gatherings, marriages, trade relationships			X		X*	
Spiritual connections		X	X	X*	X*	
Traditional knowledge	X	X	X	X*	X*	§

X denotes Indigenous well-being values

* denotes people's concerns to access the places

§ denotes the values that could be directly relevant for ABS measures, for example traditional knowledge could be used as education using ranking technique or # suggests a direct market value could be estimated.

for Indigenous people to develop and utilize their knowledge and skills to enhance capabilities that can help them to lead creative lives.

People's capabilities are further discussed below in terms of their role in well-being, by applying Sen's capability approach (Sen, 1999a,b).

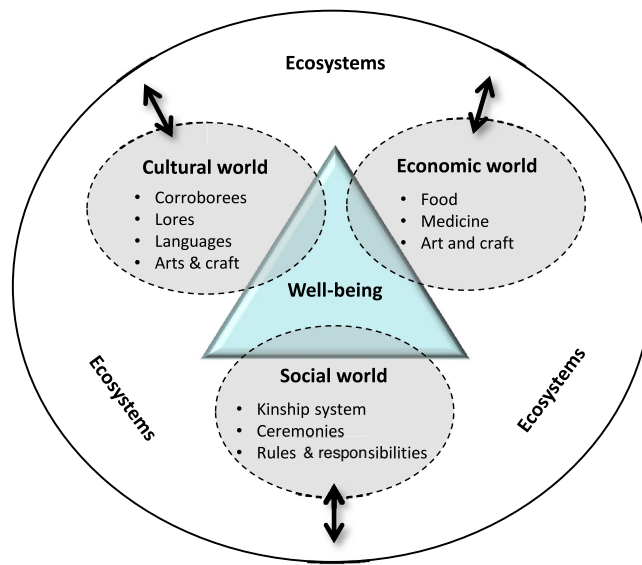


Fig. 5. Model of integrated indigenous economy and ecosystems (as proposed by Sangha et al., 2015). Each component of the economy relates to ecosystems with embedded cultural responsibility (e.g. people obtain food from their country and they have responsibility to look after their country).

Table 3

Indigenous people's capabilities in relation to their natural systems.

The Bunya Mountains 'Booburrigan Ngmmunge' provides opportunities for people to be able to:	The QMDC region provides opportunities for people to be able to:	The Mullunburra-Yidinji Clan area provides opportunities for people to be able to:
<ul style="list-style-type: none"> Practice and to pass on Traditional Knowledge on how and when to use, and manage various plants/parts of the Bunya landscape Socialize for activities – hunting, bush food, medicine etc. Art and craft opportunities, to get inspiration and to teach the young generation Conduct cultural rituals as sacred and burial sites provide opportunity for people to practice their customary ways 	<ul style="list-style-type: none"> Practice and to pass on Traditional Knowledge (bush food, medicine, knowledge on management of water ways, and natural resources (weeds/pests)) Monitor and manage water courses Gain knowledge of climatic variability and to pass this knowledge to the next generation Gain knowledge of the cultural rituals and lores 	<ul style="list-style-type: none"> Practice and to pass on Traditional Knowledge about the use and value of wild plants and animals in the Wet Tropics area Pass on cultural values and kinship system (an Indigenous system to recognize how one person is related to another by skin colour – as a guide to establish relationships) Hunt and perform initiation activities and to learn surviving skills in the bush Lead a creative life for activities such as painting, hunting, food gathering etc.

4.4. Application of the capability approach

As evident, Indigenous knowledge, cultural practices, skills, and values of natural systems directly or indirectly indicate people's capabilities. For example, Indigenous people have cultural practices such as assigning a totem (a plant or animal) to a person, and the person is responsible to take care of his/her totem. Similar, there are 'cleansing the country' cultural practices that require special knowledge and skills and these help protect the country's 'natural resources'.

According to the capability approach (Sen, 1999a,b), provision of resources enable people to develop their capabilities that help people to achieve 'functionings' (for what they value or who they are), and developing people's 'functionings' further enhance their values, thus the approach enables people to lead creative and healthy lives. From an Indigenous perspective, provision of natural resources (access to country) help people to develop capabilities i.e. traditional knowledge, cultural lores, or art related work and inspiration for painting etc., that help people to achieve their 'functionings' in terms bush food and medicine or totems (totems are plant or animal symbols that are specific to a clan with a responsibility to look after), or a painting. These set of capabilities further help people to lead healthy lives and to promote sustainable use of resources.

Based on the case studies, the main capabilities that Indigenous people possess, and that could be enhanced for their well-being, given their access to natural resources, are presented in Table 4. Traditional knowledge of bush food, medicine, art and craft, ability to teach younger generation, and ability to develop cultural protocols and lores, language, belief systems, and spiritual connections are significant capabilities that Indigenous elders possess, and which need to be passed on to the next generation (Table 4) (also expressed in personal communications with the elders from the QMDC region and the Mullunburra-Yidinji clan).

Ideally, to enhance well-being, Indigenous people should be able to use and develop their knowledge and skills that they have in relation to the natural systems. At least, this will be an important aspect of well-being for 72% of Indigenous

Table 4

Matrix of Indigenous people's capabilities in relation to natural systems and their well-being (based upon three case studies).

Capabilities	Well-being constituents					
	Basic materials for life	Good health	Social relations	Security of resources	Freedom and choice	ABS socio-economic attributes
Traditional knowledge of food and medicine	X	X	X	*	*	§
Traditional knowledge of art and craft, and of Indigenous culture			X	*	*	§
Ability to teach cultural practices and values			X	*	*	
Ability to socialize			X	*	*	§
Ability to develop cultural protocols/ lores/legal system			X	*	*	
Ability to develop and teach spiritual connections with the country		X	X	*	*	§
Ability to develop belief systems, languages and totems			X	*	*	§
Ability to manage land and water bodies/wetlands	X	X	X	*	*	§

X denotes Indigenous capabilities

* denotes the concerns to practice such capabilities/knowledge and skills due to lack of access and/or insecurity to use resources

§ denotes the role of a person's capability in current socio-economic system.

people who expressed their relationships with country (ABS, 2009–2010). Sen (1999a) argues that if welfare policies focus on enhancing capabilities and enabling them to lead their creative and healthy lives, then people's well-being will be enhanced. Currently, a lack of opportunities for Indigenous people to use their knowledge and develop their capabilities seems to be an important reason for Indigenous people to have well-being below the non-Indigenous level, as also claimed by Dodson (2010), Altman et al. (2011) and many other Indigenous leaders and researchers. This research provides some solutions by integrating information on people's values and capabilities that can help to achieve the higher levels of Indigenous well-being.

5. Discussion and conclusion

There are many reasons, historic and contemporary, for why Indigenous people's well-being is below the non-Indigenous people (as evident from various reports i.e. ABS, 2012–13, 2013; AIHW, 2011), but a major reason is the current governance and welfare policies (Martin, 2001; Davidoff and Duhs, 2008; Dodson, 2010; Pearson, 1999, 2000). The current welfare policies and well-being approach lack inclusion of country related values and capabilities that are important in Indigenous well-being, as highlighted in this paper. As a result, many of the policies could not improve well-being of Indigenous people as expected (Dodson, 2010). Given the welfare expenditure on an Indigenous person is more than double than that on a non-Indigenous person (\$44,128 for Indigenous versus \$19,589 for non-Indigenous from Indigenous Expenditure Report 2012; AIHW, 2013a,b), there are additional financial costs for the general Australian public for not raising the well-being levels of Indigenous Australians (Sangha et al., submitted for publication). No doubt, the existing policies may have contributed to reduce the gap between Indigenous and non-Indigenous well-being over the past years, but the improvements are little (as the current ABS, 2013 and AIHW, 2011 reports suggest). This study demands a review of the existing well-being framework to address this problem.

An integrated model emphasizing the connections between economic, cultural and social worlds of Indigenous people with their natural ecosystems is applied in here. There is need to develop attributes that help us measuring each of those connections to appropriately measure Indigenous well-being. We recognize that Indigenous well-being in the modern times may include a mix of utilitarian and non-utilitarian values. Thus, to develop a set of well-being measures will involve a balance of social, economic and ecological (i.e. country related values) attributes. The current ABS (2001) framework includes eight social and economic measures that could be updated for additional country related attributes. However, this requires a balance approach for appropriate weightage of each component, without duplication of any one attribute.

The Indigenous worldview on well-being is actually in line with the modern sustainable development view as suggested by Daly (2013) where economics is a subset of total ecosystem. Recently, Costanza et al. (2014) has suggested that there is need to embrace the holistic perspective of human development that is beyond the usual 'utility' oriented economic measures (such as Gross Domestic Product). Smith et al. (2013) and Summers et al. (2012) highlighted specific elements of human well-being that primarily link to various ES. However, there is little focus on understanding or learning Indigenous views. Indigenous perspectives linking people's capabilities with natural resources, indeed, provide an innovative way to

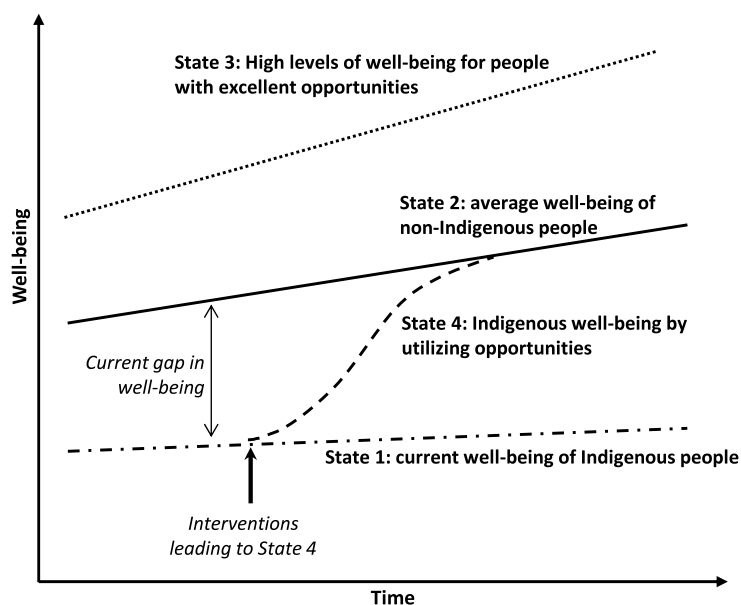


Fig. 6. Potential trends in well-being states in relation to changing capabilities of Indigenous people.

consider well-being beyond the accumulation of commodities, and can help to evaluate the role of natural systems in our well-being. Incorporating nature related attributes in well-being measures, will actually direct the government policies to target conservation values and sustainable living on planet Earth. Given the current rate of depletion of natural resources (MA, 2005), there is an urgent need for action. A socio-economic-ecological well-being approach and its related policies can help the decision makers as well as the public to bring this change quickly.

The current Australian Government well-being approach needs to change from its current utilitarian approach to a capability focused approach that will suit and enable Indigenous people to lead creative and healthy lives. Sen's capability approach has provided a novel vision for many world economies (especially, for the developing countries such as India, Bhutan etc. to the 'real' meaning of development and well-being of people (Alkire, 2005; Sen, 1999b)). It has been considered by the United Nations (UN) to measure development of people. The UN's Human Development Reports adopted the capabilities approach for incorporating education and life expectancy as people's capabilities into development measures (Human Development Report, 2011 and others). The current well-being measures in the OECD countries including Australia are suggested for review to include the capabilities of people (Volkert and Schneider, 2011). A few, such as Polishchuk and Rauschmayer (2012) applied the capability approach to investigate ecosystem effects on human development (as opposed to the mainstream economics approach). However, application of the capability approach for Indigenous people is largely missing compared to the broader economic context. The capability approach has potential to revolutionize the modern welfare economics especially for highlighting the meaning of development or well-being from Indigenous perspectives and the importance of natural systems in people's well-being. It has rarely been applied for Indigenous people's values and capabilities in relation to natural resources.

This study emphasizes that it is not just the cultural values, rather people's capabilities, that are more important for well-being and related policies. There will be greater improvements in Indigenous well-being for promoting a sense of achievement, self-esteem and strong personal identity (that equates to 'functionings' in the capability approach) given that people have access to the country that they value (Zubrick et al., 2005; Gilligan, 2006; Hunt, 2010). We demonstrate this by using a simple model (based upon data from the ABS, 2012, 2013; AIHW, 2011; Yap and Biddle, 2010 and others). In this model (Fig. 6), well-being of Indigenous people is represented as state 1 and of non-Indigenous people as state 2. Whereas, some non-Indigenous people may enjoy a higher level of well-being (state 3; Fig. 6), given they have access to resources and opportunities to enhance their capabilities. Currently, there is a significant gap between Indigenous and non-Indigenous well-being as demonstrated from states 1 and 2. There is an increasing interest from the government to close this gap (The Australian Government, Department of Social Services', recent policy on 'Closing the gap', Sept. 2013), i.e. helping people in state 1 of well-being to achieve state 2 (while progressing through state 4 of well-being). This could be achievable only if there is appropriate government intervention for Indigenous people to have opportunities to use and develop their capabilities in relation to natural resources. State 4 could be achievable in a short time span if the interventions are effective and well targeted, otherwise we hypothesize that the gap between State 1 and 2 will keep on widening over time.

Indigenous capabilities, if targeted for policy and development purposes, will enable people to maintain and build their knowledge and skills that will enhance their well-being. The present research extends the idea of people's values on natural resources (as derived in the case studies presented here) to people's capabilities. The Indigenous people in Australia have been deprived of their land in the past (Altman et al., 2005). If the Indigenous people are given access to country, it

can enhance their capabilities (e.g. traditional knowledge on bush food, medicine, culture, art and craft etc.). The recent studies from IPAs (Indigenous Protected Areas) by Gilligan (2006), Hunt (2010) and by Altman et al. (2011) suggested that people's connections to land and other natural resources played a significant role in people's socio-economic living in terms of enhancing people's self-esteem and self-respect, reducing use of alcohol and its related domestic violence, increasing interest among the youngsters to complete school education, and for increasing mental and physical well-being of people. However, these connections are usually highlighted in terms of improving people's living but not for accounting their role in saving the costs of welfare or improving people's capabilities. Sangha et al. (submitted for publication) proposed scenarios for trading off government expenditure to improve people's access to country that could save the welfare costs. At present, there are only five Indigenous Protected Areas in Queensland, with none in south-east Queensland except for a small area of 100 ha at Guanaba, near Gold Coast. There is a need to examine the importance of IPAs for saving welfare costs, promoting people's capabilities and well-being to consider for future policy decision making. It may suggest that setting up more IPAs or giving people access to country, could be a win–win situation both, for the government as well as for the Indigenous people.

Another important aspect is a lack of recognition of connections among various constituents of indigenous well-being in Australia (e.g. culture, education, health, social relations etc.) that may actually contribute to over expenditure in the current government budget. For example, advances in traditional knowledge on bush food and medicine (i.e. a capability) can improve people's health and may also reduce social problems (alcoholism etc.). If these multiple-links are considered, then the overall expenditure may be less than the estimated amount. For this, the proposed integrated framework (Figs. 4 and 5) suggesting a holistic well-being approach could be useful but it further requires assessment of how each constituent contributes to improvements in other constituents and in overall well-being. Globally, many researchers (Chan et al., 2012; Smith et al., 2013, amongst others) have suggested integrating ES into well-being frameworks to better inform policy decision makers.

A holistic perspective of Indigenous well-being could lead to policy initiatives that incorporate living on country while integrating western and traditional ways, and practising culture related rules and activities. This involves security of resources or access to land. However, a main concern, as evident in present study and has also been raised by many scholars as well as the Indigenous leaders (Mick Dodson and others), is that people lack access to their country to utilize/build their capabilities. One major concern highlighted by people in all the three case studies was freedom to use natural resources. Presently, many Indigenous people lack access to their clan sites that have been important in their lives over the past thousands of years (Grieves, 2007; Davidoff and Duhs, 2008). Providing access to natural resources could be a feasible solution for enhancing people's capabilities and hence their well-being. It can involve giving Indigenous people freedom to access or to visit the sites on a country that is highly valuable for Indigenous people (e.g. private land/national parks etc.). Currently, to claim access to a site, there are complex legal pathways such as Native titles or Indigenous Land Use Agreements, which are often cumbersome given that many Indigenous people lack the capacity to meet the legal requirements or they fail to demonstrate their connections to land (while often the older Indigenous people were removed from their land) (Grieves, 2007; Altman, 2004). This inability to claim native titles is demonstrated from the fact that there are only 134 native titles that have been obtained by the Indigenous people since the Native Titles Act was implemented in 1993 (the native title property can include part of the land or whole area, as included in an application to be assigned a Native Title) (National Native Titles Tribunal, 2012). There is a need to develop effective and simple legal procedures to enable Indigenous people to visit their clan sites.

There are benefits for the wider Australian public for promoting and developing nature related capabilities of Indigenous people. This may include saving the costs of weed management (currently \$4b, The Australian Government, Department of Agriculture–Weed Management, 2014), and of extra health and community support for Indigenous people (\$6b per year, AIHW, 2011). Above all, there will be others benefits e.g. valuing our natural resources by learning Indigenous perspectives, developing a unique heritage of traditional and western knowledge, and for promoting a sense of security and harmony in the Australian community. This can be a win–win situation for the Indigenous and non-Indigenous people, as well as for the Government to improve the currently degraded natural resources and to develop an integrated resource knowledge base that could inform the present and future generations and the decision makers. The traditional and western knowledge on the value and management of common natural resources will not only benefit the national but also the international community, and will help to preserve the Indigenous Australian heritage.

Overall, this paper provides an innovative perspective by addressing the role of natural resources in people's capabilities. The three case studies demonstrate that people's values and capabilities in relation to natural systems are directly linked with well-being that can inform the policy decision making. We hypothesize that Indigenous people's capabilities to the use and value natural resources, and people's security and freedom to do so, will enable them to lead creative and healthy lives that will have a direct positive impact on their well-being.

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