


## Evaluating ecological well-being on permaculture sites: a case study across Australia

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**Abstract:** In an urbanised world, people have been distanced from nature, generating a lot of environmental and social issues, leading to health and economic problems as a consequence. In the opposite way, some people are looking for other perspectives to live close to nature, looking for a better quality of life, and this new lifestyle has not been evaluated by common sense based on economic standards. Ecological well-being as a goal sits where people are part of nature and not something strange to our mother Earth. This paper presents the application of the Permaculture MESMIS methodology used to evaluate the ecological well-being to four groups of practitioners permaculturists across Australia, including the neorural experienced (1), the neorural less experienced (2), the suburban (3) and the urban (4). The results showed that the Permaculture MESMIS methodology works as a tool designed to specifically evaluate permaculture-designed lands. The obtained scores for all the profile groups reveal an increase in ecological well-being status through the permaculture ethics and design principles incorporation. Considering all data in hand, the behavior follows the same trends, confirming permaculture as a positive way to promote nature reconnection.

**Keywords:** Permaculture; Well-being; MESMIS permaculture; Neorural

### INTRODUCTION

After the second world war, the civilization started a developing model based on chemicals and mechanization of farms, known as industrial agriculture. As a consequence, people have migrated in a massive way to the cities around the world because they labour force was not necessary in the countryside, thus separating people from nature and increasing their food/life dependency condition in an urbanised world. In this scenario, permaculture appears as a conscious alternative to this nature apparted model (Lockyer & Veteto, 2013, p. 116), not only for small-scale but for medium-sized farmers who are now struggling to obtain a better quality of life through organic growing, protection of the environment and social engagement in a local scale.

In this way, the global permaculture movement and network had been increased “quickly and largely decentralized, informal movement” (Ferguson and Lovell, 2015 in (Morel et al., 2019), being employed individually by communities or in local and national governments as is the

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case of Cuba, Brazil, Vietnam and Senegal (Lockyer & Veteto, 2013, p. 104).

This research aimed to evaluate if permaculture would provide ecological well-being (EWB) through the incorporation of its ethics and design principles. To perform this test, we adopted the Permaculture MESMIS framework (Nanni et al., 2021; Paiter et al., 2018).

### **Urban-rural migration**

Urban-rural migration can be defined as a movement that comprises the decision and the action of exchanging an urban place of living for one in the rural areas. One of the reasons to migrate from an urban area to a rural one is the necessity to find for a better environment where the "desire for peace and quiet, security needs, and less crime, as well as the aesthetics of the natural environment itself" can be reached (Burnley and Murphy, 2004 in Costelo, 2007). Another reason is that housing is frequently cheaper in the rural areas (Costelo, 2007).

One of the biggest problems about living a sustainable life in the cities is the fact that they promote a "nature blindness" that avoids people from "acknowledging the environment as a foundation for human living, especially in terms of supplying the material resources, waste absorption and other ecosystem services that are part of urban metabolism" (Lockyer & Veteto, 2013, p. 137).

As an overview, neorural definition involves a set of values and ideas related to people who live in urban areas and what they are looking for in order to live in the countryside, which are better quality of life and opportunities to achieve a desired well-being level (Giuliani, 1990).

The neorural was primarily described in France around 1945, after the end of the second world war. Nowadays, neorural is understood as a new phenomenon linked to an "urbanised world" and described as a solution for people who live in countries in economic crisis, where life in the city has turned to be more expensive and with low quality. These factors are pushing young people to migrate from town to the countryside. "The neorural phenomenon is far more detached from urban centres and thus offers the interest of contributing, when necessary, to revitalising rural areas which have often been emptied of their substance by a century-long rural exodus" (Chevalier, 1993, p. 176).

Nowadays, there are different reasons for urban-rural migration. One of them is the advent of broadband internet across rural areas, allowing the migrants to live in the countryside and work at a distance. Another reason is the economic crisis, as the one that happened in Greece when "an unprecedented number of unemployed young Greeks move 'en masse' to the countryside encouraged by government stipends to cultivate tracts of land that have been left untended for years" (Wearden & Fletcher, 2012). Someone of these unemployed says that "were willing to earn less for a better quality of life" (Wearden & Fletcher, 2012). In the USA, young people are exchanging the office for farms, initiating as a local-food movement and organizing Community Supported Agriculture (CSA) systems. This migration is changing the rural scenario, where "the number of farmers under 35 years old is increasing", according to the U.S. Department of Agriculture's latest Census of Agriculture (Dewey, 2017).

Small farms of neorural people in Argentina and Cuba are showing that permaculture is one of the factors helping to increase the neoruralism movement through two ways. The first one is the increase of urban middle class people seeking to turn neorural profile using the permaculture principles, helping it to establish themselves in rural areas. The second one is the neoruralism promoted by permaculture and related to other social actors as farmers and peasants "looking for a re-peasantry, not necessarily linked to a counterculture movement, but benefited by the permaculture techniques and practices as an enhancer for the knowledge that already have" (De Matheus e Silva, 2013). The same author refers that permaculture improved production diversification and resilience, and quality of life as well.

Australia is one of the most urbanized countries, where "two in every three Australians live in a Capital City"<sup>2</sup>. Around 86% of its population lives in the coastal urban perimeters, as diagnosed by the "Australia State of the Environment 2021 Report Facts Sheets Coasts"<sup>3</sup>.

A study about urban-rural migration in Australia showed that changes in consumption and lifestyle values and behavior are one of the external reasons for reducing rural-urban migration and absorption of labour in family farms (Hugo & Smailes, 1985). From the 70s to today, the "back to the land movement" is seen as "a more wholesome alternative to consumer society" (Crosby et al., 2014) motivating internal migrations in Australia to coastal and rural areas, known as the "counter urbanization" movement. In fact, "yet most movement is to non-metropolitan coastal centres, often but not always, within two hours commute of the largest cities" (McManus, 2022), even during the COVID-19 pandemic. Another evidence comprovig this movement is the focus of Holmgren's *RetroSuburbia* book (Holmgren, David, 2018), once suburbs in Australia and its horizontalised cities offer a "complete", urbanized infrastructure.

## Well-being

The common sense of well-being drives us to a synthetic lifestyle where minor effort, consumerism and comfort are the main aims to be achieved. Additionally, people keep their *habitus* lifestyle inside the "normed routinization of the surrounding social field" (Lockyer & Veteto, 2013, p. 140), driving them to live in passivity and conformity way. The problem with this model of life quality is its huge dependency on fossil fuels and the enormous environmental impacts and problems generated (Gundersen & O'Day, 2009, p. 166). In this context, one of the most important problems is the "loss of biodiversity poses a risk to human well-being because it is linked to a number of essential ecosystem services, such as natural pest control, pollination, and nutrient cycling" (Tscharrntke et al., 2005 in Krebs & Bach, 2018), causing a huge environmental crisis that threatens the well-being and even the survival of the world's expanding population (Holmgren, 2013). As a solution, these authors commented, "a key step in making this transition will be education at all levels, an education that increases environmental awareness and inspires people to live more sustainable lives".

In a common-sense, well-being is "to be only moderately linked with other concepts such as income, number of friends and physical health, due to numerous other intervening variables"

<sup>2</sup> - [Australia's population | Centre for Population](#)

<sup>3</sup> - [Coasts - 2021 State of the Environment Report](#)

(Diener, 2000 in (Cervinka et al., 2012, p. 360). In another way, it was concluded that the fullness of life satisfaction is non-material and can be found in nature (Myers & Diener, 1995), affirming yet that the pursuit of happiness does not include only a consumption-based lifestyle.

In the field of environmental psychology, some researchers are concluding that living in a more ecological way can produce more happiness than a life based on consumption because ecological "individuals hold intrinsically oriented values and are more mindful of their inner experience and behavior" (Brown & Kasser, 2005, p. 360).

Permaculturists are oriented by a set of core ethics that requires a "balance the goal of maximizing production against practices that might create negative impacts on the social and natural elements that are part of the system" (Gundersen & O'Day, 2009, p. 169). Thus, permaculture aims to protect the environment as our nest. Furthermore, the "permaculture paradigm provides a holistic and common-sense approach that recognizes humans as an integrated part of ecosystems" (Lockyer, J. & Veteto, J.R., 2013, p. 97). In this way, this research understands that permaculture can provide well-being easier than other environmental education ways.

## **Permaculture and ecological well-being**

An ecological *habitus* can be the key to advancing to ecological well-being where the inertial behavior of people poses a low-impact way to live based on the logic "to live well in the place" and enjoying it socially and ecologically in an integrated manner (Lockyer, J. & Veteto, J.R., 2013, p. 142). Furthermore, we need to understand health and well-being from a holistic perspective, both defined as "the result of a combination of physical, social, intellectual and emotional factors" (*Permaculture Association*, 2021) and considering evidence that nature can provide happiness and how to reach it through "is get your fingers dirty and harvest your own food" to increase serotonin and release dopamine in the brain (Francis, 2020).

Permaculture is based on three ethics: Earth care, People care and Future care. Considering them, we note that it help "us reflect on our choices as we work toward the shared goals of individual, societal, and ecosystem well-being" (Brain et al., 2017, p. 506), aiming to build "a healthy earth as the basis of our human well-being and healthy human environments... and access to the resources necessary for their well-being and basic needs... for achieving a healthy and flourishing life" (Fadaee, 2019, p. 5). "For many people, permaculture is a philosophy and way of life. It is about taking responsibility for your own life and doing the things you feel are important for your own well-being, for the well-being of others and the well-being of the planet" (Ross Mars & Jenny Mars, 2007).

One of the highlighted characteristics of permaculture is to be seen "as a world view that defends and constructs the potential of synergistic effects on human well-being and ecosystem health... based on ecological and systems-thinking principles" (Rocha, 2022, p. 9). Thus, "unlike movements based mostly on escape from the mainstream, permaculture offered a repertoire, and a system of adaptable solutions" (Crosby et al., 2014), working as a "framework for structural and management plans that prioritise the relational well-being of every species" (Raynolds, 2022, p. 2), promoting life "both in the country and the city..."

articulating global matters of concern such as food production, renewable energy sources, and ecological well-being in deeply localised variants" (Crosby et al., 2014).

In a holistic way there are five ways to "improve well-being: connect, be active, take notice, keep learning and give", placed alongside some key aspects of permaculture "helps to further demonstrate how permaculture and well-being complement each other" (Maxey, 2017). Thus, "to craft a 'permanent culture', permaculture designers draw on local geographic, sociologic, geologic, hydrologic, and biologic features to construct complex and interactive biosystems that include the activities of thriving human communities as design elements in the system." (Gundersen & O'Day, 2009b). In synthesis permaculture can be understood as "a powerful way to understand how nature works from an individual perspective, including plants growth, climatic conditions, energy sources, etc., and considering those elements as part of a sustainable lifestyle" (Lockyer, J. & Veteto, J.R., 2013, p. 140).

## **METHODOLOGY**

### **Interviewee selection**

To select the sample, a pre-survey was performed in an online environment with five basic questions: Was permaculture one of the most important reasons for your move from a metropolitan, urban, peri-urban or suburban location to a semi-rural or rural location? What year did you complete your PDC? How many years have you lived in a semi-rural or rural location? And, Would you like to be involved in this research and share more information with us about your life as a permaculture practitioner? Once answered "yes" to the last one question, the interviewee was contacted to take a personal interview using a procedure explained ahead.

### **Data collection**

All participants signed the Consent form, an obligatory document and part of the research project approved by the CQUniversity Human Research Ethics Committee, approval number 20780.

The data were collected in the summer of 2018 involving 21 permaculturists across Australia. In order to measure the intensity of Ecological Well-being (EWB) we adopted the Permaculture MESMIS framework (Nanni et al., 2021, p. 31). The Permaculture MESMIS comprises a semi-structured questionnaire, based on Likert scale, involving permaculture ethics and design principles. This framework (1) has considered 36 statements to evaluate how much the sample farmers incorporated permaculture ethics and principles into the management of their farms. Thus, this application of permaculture ethics is understood as reflective of EWB. To register any additional feedback from permaculturists, the interviewees were stimulated to give more in-depth answers to each statement.

A comparison between different moments of incorporation of permaculture ethics and design principles was performed by applying the Permaculture MESMIS in two "rounds". The first round reflects the current moment, but considering the finishing of the PDC up to today. The second round requests from the interviewee the following question: How do you think you

would have answered these questions differently before you took your PDC? In this second “round”, the interviewee needs to think about its condition before the PDC in order to incorporate the permaculture ethics and principles using analogies for their living environment.

Table 1. Permaculture MESMIS interview questionnaire for evaluating ecological well-being.

<b>Earth care (environmental)</b>					
<b>Design principles</b>	<b>Likert scale and scores</b>				
	<b>Strongly disagree (1)</b>	<b>Disagree (2)</b>	<b>Undecided (3)</b>	<b>Agree (4)</b>	<b>Strongly agree (5)</b>
1 - Observe and interact	The design and management of my farm is based on observation and interaction with nature				
2 - Catch and store energy	The farm’s energy needs are provided by capture and storage on site				
3 - Obtain a yield	Our food needs are met by what is grown and produced on site				
4 - Apply self-regulation and accept feedback	I change my behavior in response to nature’s feedback				
5 - Use and value renewable resources and services	When I use renewable resources and services I consider their long term impact				
6 - Produce no waste	Waste produced on site is reused				
7 - Design from pattern to details	I consider natural patterns in the design and management of my farm				
8 - Integrate rather than segregate	Elements and functions are well integrated on my farm				
9 - Use small and slow solutions	I use small and slow solutions when implementing a new landscape design				
10 - Use and value diversity	The farm is designed to increase and value a diversity of species				
11 - Use edges and value the marginal	The landscape design of my property maximises edges and use of margins areas where land of different types join				
12 - Creatively use and respond to change	The landscape design of my property allows for flexibility and adaptability				
<b>People care (social)</b>					
13 - Observe and interact	I interact with and have a good relationship with my neighbours				
14 - Catch and store energy	The inputs for my property are produced locally				
15 - Obtain a yield	The food produced on my farm is not grown with chemical inputs				
16 - Apply self-regulation and accept feedback	I change my behavior in response to social/community feedback				
17 - Use and value renewable resources and services	I use renewable community resources and services considering their long term impact				
18 - Produce no waste	I avoid sending waste to landfill				

Design principles	Likert scale and scores				
	Strongly disagree (1)	Disagree (2)	Undecided (3)	Agree (4)	Strongly agree (5)
19 - Design from patterns to details	I seek broader community input in making design decisions				
20 - Integrate rather than segregate	I open my farm to the public and seek to establish partnerships with others				
21 - Use small and slow solutions	I work collectively with my community to resolve local issues				
22 - Use and value diversity	I respect other people's choices: ethnicities, sexual orientation, gender, ages, religion, culture and seek to relate to people in a consistent manner				
23 - Use edges and value the marginal	I believe socially progressive marginalised movements add value to society				
24 - Creatively use and respond to change	I take action to respond to social crisis and solve problems in my community				
<b>Future care (economics)</b>					
25 - Observe and interact	I recognise and respond to limits on production and consumption on my farm				
26 - Catch and store energy	Farm inputs are generated on site				
27 - Obtain a yield	My income is generated by activities on site				
28 - Apply self-regulation and accept feedback	I consider fair share in consumption and distribution of resources				
29 - Use and value renewable resources and services	I don't spend money on non-renewable resources				
30 - Produce no waste	I consider waste as a resource				
31 - Design from patterns to details	I use integrated systems to design for efficiency and optimise productivity				
32 - Integrate rather than segregate	I seek to integrate my production with other local farms				
33 - Use small and slow solutions	When facing a production problem, I resolve the problem with ecological management and avoid the use of chemicals				
34 - Use and value diversity	My farm generates a diversity of income streams				
35 - Use edges and value the marginal	I consider gaps in the market when deciding which product streams to invest on my farm				
36 - Creatively use and respond to change	I creatively respond to and solve production flow issues				

## Data evaluation

Aiming to determine whether there were improvements in EWB between the moment before the PDC and the current moment, a simple arithmetic average of the obtained values was performed, in order to compare both moments. After that, the ratio between the current moment and the one before the PDC was determined. In this sense, values greater than “1” indicate an increase in EWB and, less than “1”, show a decrease.

## RESULTS AND DISCUSSION

Once the interviews were finished, the data from 21 interviewees was analysed in order to define its groups of context and practical knowledge affinity. Thus, the interviewees were divided into four groups according to each profile described in 2.

The first one is titled as “neorural and experienced” profile group, and it includes those permaculturists who started permaculture practice more than 10 years ago. All interviewed people live in rural places and, in some cases, in an almost urbanized condition because cities are growing over rural places.

Afterwards, it was possible to identify a “neorural and less experienced” group, including those who started permaculture practice less than 10 years ago. This group encompasses the majority of the interviewees in this research. They are already living in rural properties fully permaculture-managed, and some live in properties partially permaculture-planned. Only one of them lives in a suburban area and is waiting for an opportunity to move.

The next one is the “suburban” group. It comprises permaculturists living in urban (considering infrastructure) or suburban conditions but practising permaculture in an external place, like rural or suburban places.

The last one is the “urban” profile group. It is entirely composed by permaculturists who live in urban places and practice permaculture in their backyard or in community gardens.

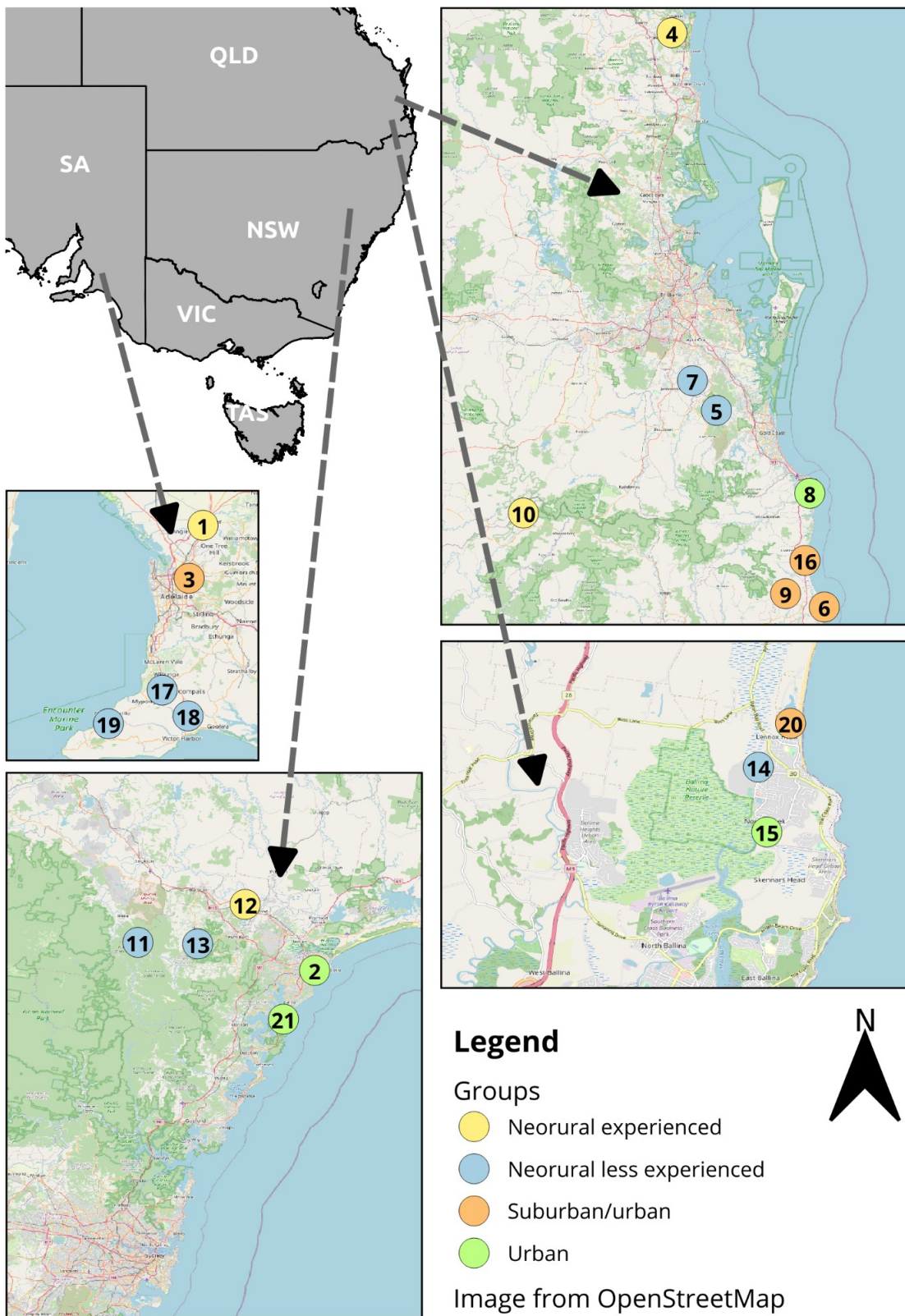
Table 2. Groups and related interviewees (by research code).

Group/Profile	Interviewees	n
Neorural and experienced	1, 4, 10, 12	4
Neorural and less experienced	5, 7, 11, 13, 14, 17, 18, 19	8
Suburban	3, 6, 9, 16, 20	4
Urban	2, 8, 15, 21	4

The distribution of the interviewees (1) shows that they are mainly located around Adelaide, near to Newcastle/Maitland suburbs, along to the Gold Coast and the southern suburbs of Brisbane, according to McManus (Crosby et al., 2014).



Figure 1. Distribution of interviewees across Australia.



### Permaculture MESMIS results

The application of MESMIS permaculture and determination of simple arithmetic average scores for each profile group was performed, aiming to identify different characteristics. 3 shows these scores obtained for each group and the ratio between “Current” over “Before PDC” moment. This procedure was adopted because it spotted a piece of expected evidence that says that the more permacultural practice they live, the more the scores will increase. In fact, all ratios calculated for MESMIS permaculture scores, excluding only statement 28 for the “urban” profile group, are above “1”, as shown in 3. The AMOEBA plot (2) shows a better way to this behavior of increasing scores, which can be associated with the incorporation of permaculture ethics and design principles.

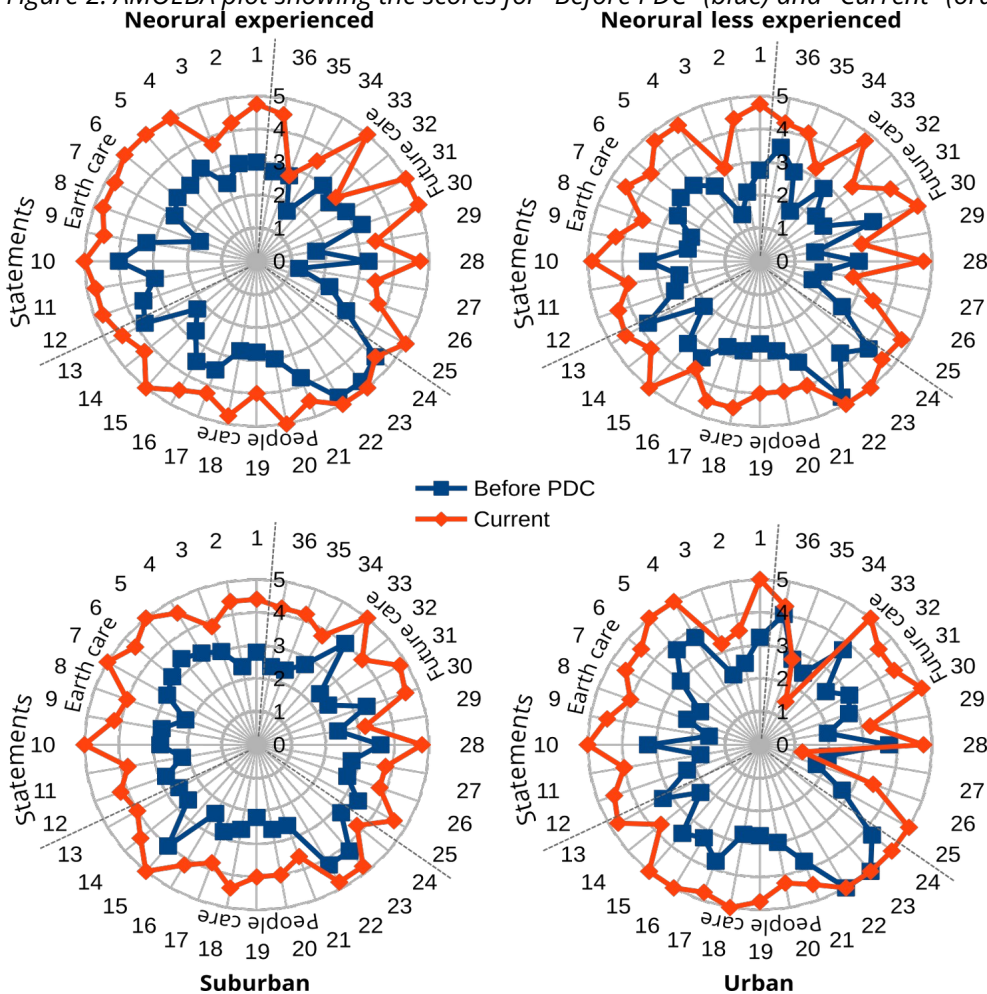
Table 3. Permaculture MESMIS simple arithmetic average scores for each profile group, considering all statements for “B” – before PDC and “C” – current.

State- ment	Neorural experienced			Neorural less experienced			Suburban			Urban		
	B	C	Ratio	B	C	Ratio	B	C	Ratio	B	C	Ratio
1	3,00	4,75	<b>1,58</b>	2,75	4,75	<b>1,73</b>	2,80	4,40	<b>1,57</b>	3,25	5,00	<b>1,54</b>
2	3,00	4,25	<b>1,42</b>	2,13	4,38	<b>2,06</b>	2,40	4,40	<b>1,83</b>	2,50	3,50	<b>1,40</b>
3	2,50	3,75	<b>1,50</b>	1,50	3,00	<b>2,00</b>	3,00	3,80	<b>1,27</b>	2,25	3,25	<b>1,44</b>
4	3,25	5,00	<b>1,54</b>	2,63	4,75	<b>1,81</b>	3,20	4,60	<b>1,44</b>	3,75	5,00	<b>1,33</b>
5	3,00	5,00	<b>1,67</b>	3,00	4,75	<b>1,58</b>	3,40	5,00	<b>1,47</b>	3,75	5,00	<b>1,33</b>
6	3,00	5,00	<b>1,67</b>	3,00	4,13	<b>1,38</b>	3,20	4,60	<b>1,44</b>	3,00	4,50	<b>1,50</b>
7	2,75	4,75	<b>1,73</b>	2,75	4,50	<b>1,64</b>	3,00	5,00	<b>1,67</b>	2,00	4,50	<b>2,25</b>
8	1,75	4,75	<b>2,71</b>	2,13	3,63	<b>1,71</b>	2,20	4,00	<b>1,82</b>	2,25	4,00	<b>1,78</b>
9	3,25	4,50	<b>1,38</b>	2,13	4,25	<b>2,00</b>	2,80	4,20	<b>1,50</b>	1,50	4,50	<b>3,00</b>
10	4,00	5,00	<b>1,25</b>	3,25	4,88	<b>1,50</b>	2,80	5,00	<b>1,79</b>	3,25	5,00	<b>1,54</b>
11	3,00	4,75	<b>1,58</b>	2,38	3,88	<b>1,63</b>	2,20	3,80	<b>1,73</b>	1,75	4,00	<b>2,29</b>
12	3,50	4,75	<b>1,36</b>	2,63	4,38	<b>1,67</b>	2,80	4,20	<b>1,50</b>	2,25	4,50	<b>2,00</b>
13	3,75	4,50	<b>1,20</b>	3,75	4,50	<b>1,20</b>	2,60	4,00	<b>1,54</b>	3,25	4,75	<b>1,46</b>
14	2,25	4,25	<b>1,89</b>	2,13	4,13	<b>1,94</b>	2,60	4,40	<b>1,69</b>	2,25	3,75	<b>1,67</b>
15	2,75	5,00	<b>1,82</b>	3,25	5,00	<b>1,54</b>	4,00	5,00	<b>1,25</b>	3,50	5,00	<b>1,43</b>
16	3,50	4,50	<b>1,29</b>	3,38	3,75	<b>1,11</b>	2,40	4,20	<b>1,75</b>	3,25	5,00	<b>1,54</b>
17	3,50	4,25	<b>1,21</b>	2,75	4,50	<b>1,64</b>	2,80	3,80	<b>1,36</b>	3,75	4,75	<b>1,27</b>
18	2,75	4,75	<b>1,73</b>	2,75	4,50	<b>1,64</b>	2,60	4,40	<b>1,69</b>	2,75	5,00	<b>1,82</b>
19	2,75	4,00	<b>1,45</b>	2,50	4,00	<b>1,60</b>	2,20	4,00	<b>1,82</b>	2,75	4,75	<b>1,73</b>
20	3,00	5,00	<b>1,67</b>	2,75	4,00	<b>1,45</b>	2,60	4,00	<b>1,54</b>	3,00	4,25	<b>1,42</b>
21	3,75	4,50	<b>1,20</b>	3,25	4,00	<b>1,23</b>	2,60	3,60	<b>1,38</b>	3,75	4,50	<b>1,20</b>
22	4,75	5,00	<b>1,05</b>	4,75	5,00	<b>1,05</b>	4,20	4,80	<b>1,14</b>	5,00	5,00	<b>1,00</b>
23	4,75	5,00	<b>1,05</b>	3,63	5,00	<b>1,38</b>	4,20	4,80	<b>1,14</b>	5,00	5,00	<b>1,00</b>
24	4,50	4,50	<b>1,00</b>	4,13	4,63	<b>1,12</b>	3,20	3,80	<b>1,19</b>	4,25	5,00	<b>1,18</b>
25	3,00	5,00	<b>1,67</b>	2,75	4,75	<b>1,73</b>	3,40	4,60	<b>1,35</b>	2,75	5,00	<b>1,82</b>
26	2,25	3,75	<b>1,67</b>	1,63	3,50	<b>2,15</b>	2,80	3,80	<b>1,36</b>	1,75	3,50	<b>2,00</b>
27	1,25	3,50	<b>2,80</b>	1,88	2,75	<b>1,47</b>	2,80	3,80	<b>1,36</b>	2,00	1,25	<b>0,63</b>
28	3,25	4,75	<b>1,46</b>	2,88	4,75	<b>1,65</b>	3,60	4,80	<b>1,33</b>	3,75	4,75	<b>1,27</b>
29	1,75	3,50	<b>2,00</b>	1,63	3,00	<b>1,85</b>	2,40	3,20	<b>1,33</b>	2,00	3,25	<b>1,63</b>

Statement	Neorural experienced			Neorural less experienced			Suburban			Urban		
	B	C	Ratio	B	C	Ratio	B	C	Ratio	B	C	Ratio
30	3,25	5,00	<b>1,54</b>	3,50	4,88	<b>1,39</b>	3,40	4,60	<b>1,35</b>	2,75	5,00	<b>1,82</b>
31	3,00	5,00	<b>1,67</b>	2,13	4,38	<b>2,06</b>	2,40	4,80	<b>2,00</b>	3,00	4,50	<b>1,50</b>
32	2,75	3,00	<b>1,09</b>	2,13	3,50	<b>1,65</b>	2,40	4,00	<b>1,67</b>	2,50	4,50	<b>1,80</b>
33	3,00	5,00	<b>1,67</b>	2,88	4,75	<b>1,65</b>	4,00	5,00	<b>1,25</b>	3,75	5,00	<b>1,33</b>
34	1,75	3,50	<b>2,00</b>	1,75	3,25	<b>1,86</b>	2,80	3,80	<b>1,36</b>	2,50	1,50	<b>0,60</b>
35	2,75	2,75	<b>1,00</b>	2,88	4,13	<b>1,43</b>	2,40	4,20	<b>1,75</b>	2,75	2,75	<b>1,00</b>
36	2,75	4,50	<b>1,64</b>	3,50	4,25	<b>1,21</b>	2,40	4,20	<b>1,75</b>	4,00	4,25	<b>1,06</b>
<b>Average scores</b>	3.02	4.47	<b>1.56</b>	2.74	4.23	<b>1.60</b>	2.91	4.29	<b>1.51</b>	2.99	4.30	<b>1.52</b>

The average scores obtained (3) shows ratios around 1,5 that can be understood as an increase of 50% from time "Before PDC" and "Current". It can be interpreted as evidence of incorporating permaculture ethics and design principles and, probably, offering a better scenario of Ecological Well-being (EWB).

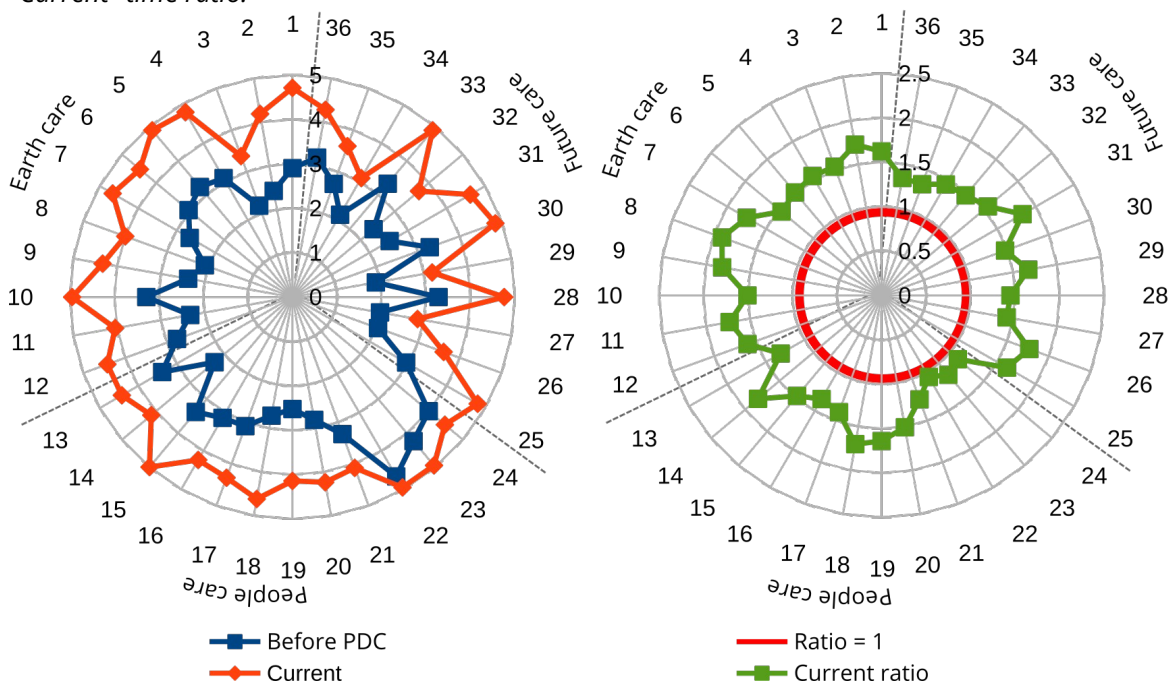
Figure 2. AMOEBA plot showing the scores for "Before PDC" (blue) and "Current" (orange) times.



## Result synthesis

When considering the average scores for each statement for all profile groups, evidence of an increase in EWB for the behavior of all interviewees is clearly seen. In the left plot of 3, the proximity of points (averages) means a less significant increase in ecological well-being (EWB). On the other hand, far the distance between lines, the bigger the EWB increment. Aiming to simplify the meaning of understanding, the right plot shows the ratio Current/Before PDC where the closer to "1" (red line), the less significant the changes in the interviewees' behavior. Ratios smaller than "1" mean decrease of EWB, and bigger means increase.

Figure 3. Synthesis for all data. Left amoeba shows the average scores for "Before PDC" and "Current" time. Right amoeba shows the comparison between ratio equal 1 (without increase) and "Current" time ratio.



The average ratio registered for all statements is around 1.6 (1.57). Ratios plot shows better assimilation of permaculture principles for "Earth Care" ethics, followed by "Future Care" and "People Care".

Considering that the majority of interviewees have a non-longer PDC conclusion time (less than 10 years ago), It should indicate that ethics and design principles' incorporation can provide, in the short term, a better comprehension of how nature works. The bigger score on statement "8" (Elements and functions are well integrated on my farm) sounds like a better understanding of holistic management when once learned about how nature works, it is easier to link elements in a designed place.

The small EWB for "People Care" can be associated with a short-term life in a new place and, of course, the neighbourhood's misunderstanding of the social relationship promoted by permaculture. As commented by some interviewees, "It is too hard to explain why I do everything, considering feedback. The surrounding people do not understand what really

permaculture is.”

The peak registered on Statement 14 (The inputs for my property are produced locally) can be related to a better concern about local consumption prioritised by permaculturists. It also shows a vigorous affirmation about the local development assimilated in the current moment and probably linked to the commitment to building a healthy community and, as a result, promoting collective well-being.

The lowest ratios (near to 1) registered in the Statement 22 (I respect other people's choices: ethnicities, sexual orientation, gender, ages, religion, culture and seek to relate to people in a consistent manner), 23 (I believe socially progressive marginalised movements add value to society) and 24 (I take action to respond to social crisis and solve problems in my community), should explain evidence that permaculturists have a previous awareness about social iconic causes.

The EWB medium ratios registered for “Future Care” probably show the clear behavior linked to a recent lifestyle established in the countryside, once it is not possible to establish business models to provide production destiny for commercialization in the short term. A small detail was seen. Some of the interviewees comprised retired people whose main concern was not the economic.

The Permaculture MESMIS was successful in reaching the major aim of the research, demonstrating, in a generic way, that permaculture increases EWB for people seeking to live in the countryside, in a nature reconnection, and a sustainable lifestyle.

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