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Article

Fostering Collaborations towards Integrative Research Development

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Abstract: The complex problems associated with global change processes calls for close collaboration between science disciplines to create new, integrated knowledge. In the wake of global change processes, forests and other natural environments have been rapidly changing, highlighting the need for collaboration and integrative research development. Few tools are available to explore the potential for collaborations in research ventures that are just starting up. This study presents a useful approach for exploring and fostering collaborations between academics working in research teams and organizations comprising multiple science disciplines (*i.e.*, multi-disciplinary). The research aim was to reveal potential barriers, common ground, and research strengths between academics working in a new centre focused on forest and climate change research. This aim was based on the premise that raising awareness and working with this acquired knowledge fosters collaborations and integrative research development. An email survey was deployed amongst the academics to obtain: (i) their understanding of common themes (e.g., climate change, scale of investigation, woodland/forest health/decline); (ii) descriptions of the spatial and temporal scales of their research; and (iii) their approach and perceived contributions to climate change research. These data were analysed using a semi-quantitative content analysis approach. We found that the main potential barriers were likely to be related to differences in understanding of the common research themes, whilst similarities and disciplinary strengths provided critical elements to foster collaborations. These findings were presented and discussed amongst the centre academics to raise awareness and create a dialogue around these issues. This process resulted in the development of four additional research projects involving multiple disciplines. The approach used in this study provides a useful methodology of broader benefit to similar multi-disciplinary research teams and organizations elsewhere.

Keywords: barriers; climate change; collaboration; common ground; disciplinary research strength; language and understanding; multidisciplinary; interdisciplinary; transdisciplinary; southwest Western Australia; woodland and forest health research

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1. Introduction

Developing integrative research has been widely recognized as an important research development in dealing with complex environmental issues [1–3]. Following Tress *et al*. [1], we define integrative research as the collaboration between multiple research disciplines addressing a common problem that through this process develop new integrated knowledge and theory. The necessity for integrative research is increasingly becoming more important in our rapidly changing environment [2]. Global change processes like climate change are complex issues that have a world-wide impact on natural environments [4]. The physical impacts of these processes are rapidly emerging, highlighting the urgency for a timely response from the research community [5]. In this context, there is a need for research initiatives that focus on understanding the impacts, vulnerability and adaptation to these processes [5,6], particularly in important ecosystems such as woodlands and forests [6–8]. The complexity of global environmental change processes asks for new approaches in research based on closer collaboration between science disciplines to provide timely and appropriate solutions.

The process of conducting integrative research has been explored in multiple studies dealing with forested landscapes (e.g., [3,9–11]). These studies highlighted that many potential obstacles and pitfalls make the development of integrative research a challenging task. Many of these obstacles are related to differences in research paradigms between disciplines, and particularly between the natural and social sciences [1]. For instance, a key obstacle was found to be the differences in the scales of investigation used within and between different research disciplines [12,13]. Particularly with global processes like climate change, aligning the scales of investigation was found to be important to enable the integration of research results, but this was often difficult to achieve because of fundamental differences in research scales used by individual disciplines [9,12,13]. Furthermore, effective communication and finding a “common language” was highlighted as critical to the success of integrative research [3,9–12,14]. Academics from different research disciplines, however, were generally found to use different terminology and had different meanings for the same words making communication and working together difficult [10,13].

These issues were highlighted as making the process of integrative research development highly time consuming [3,12]. Pursuing the development of integrative research in many cases will therefore potentially be problematic [1], where in this day and age there is still a considerable miss-match between the time available (e.g., due to short-term funding) and the time needed to foster integrative research [3]. Furthermore, only a few studies present effective strategies to identify potential barriers and how to progress integrative research development, which is particularly useful for research organizations in the process of starting up [2]. This highlights a significant issue in current research practice, and as such, solutions are needed to improve our approach and success in fostering collaborations and integrative research development.

Research ventures addressing complex problems at the landscape-scale, such as climate change impacts, have become more and more the standard in forest research. The people working in these ventures have equally encountered the obstacles and pitfalls of integrative research development [10]. A critical first step in the process of integrative research development is to explore and foster collaborations between academics from different research backgrounds. We report here on a useful approach that was aimed to explore, analyze and promote these initial collaborations between academics working within a short-term funded multi-disciplinary international research centre focused on studying the effects of climate change on highly diverse forested ecosystems. We investigated: (i) the potential barriers; (ii) the level of mutual understanding (*i.e.*, common ground) of the problem and research aims; and (iii) the individual research strengths and skills of the academics, as a starting point for promoting collaborations. We used this information to raise awareness among the academics of the potential barriers to collaborations, and to identify the areas with high potential for project development based on existing common ground and research strengths.

2. Methods

This study focused on the Western Australian Centre of Excellence for Climate Change, Woodland and Forest Health (www.foresthealth.com.au) [15] that was founded in response to the observed declines in tree health in the southwest of Western Australia (SWWA). Forested ecosystems unique to the SWWA Mediterranean ecoregion have increasingly shown declines in health and mortality related to the changes in climate in this region [16–19]. Climate change has further been flagged as one of the key processes to have a negative impact on the rich biodiversity and natural resources SWWA currently supports [20]. The high biological values of this region and the human basis of the threats it faces, highlights the need for natural and social science disciplines to collaborate and provide integrated knowledge to effectively deal with these change processes. This centre has been aiming to do so.

The centre was founded in February 2009 to conduct research in forested ecosystems across SWWA, and received funding for five years. It is an international research venture between Australian and international universities, and federal and local government, and is widely supported by industry, and private stakeholders. In addition to 17 tenured academic staff, national and international early-career academics (postdoctoral (7) and PhDs (3)) with different research backgrounds in natural and social sciences were recruited to develop and undertake projects within 3 years of funding. The projects and early-career academics started at different times over a period of two years. This process resulted in a short 3-year window for the development of collaborations and potential integrative research projects.

The centre academics were allocated to one of four specific programs. Program 1 (P1, Process and ecosystem modeling) included six ecosystem modeling specialists, one forest pathologist and one landscape ecologist. Program 2 (P2, Decline ecology) included tree and forest pathologists (*3*) and physiologists (*5*). Program 3 (P3, Restoration ecology) included vegetation (*3*) and fauna (*3*) restoration ecologists, and Program 4 (P4, People, policy and communication) included two social scientists active in the fields of sociology and political science, and three environmental science education and communication specialists. In addition to fourteen disciplinary program specific projects, the mission of the centre was to create additional new integrative projects including academics and non-academics from different fields of expertise in an attempt to create integrated knowledge. For more details, see www.foresthealth.com.au [15].

To explore the potential for collaborations between the academics within the centre, first a one-day workshop was organised. This workshop was aimed at collectively exploring opportunities for developing collaborations and integrative research projects within the centre's research framework. To attempt promoting mutual understanding of integrative research concepts and their development, first an overview of the different approaches was presented following Tress *et al*. [1]. The different concepts presented showed that integrative research can only be achieved with intensive communication and interaction between the people involved (see further Tress *et al*. [1]). This exercise further showed that many of the academics, being trained within the boundaries of one specific research discipline, were relatively new to the concepts that were presented. This has been identified as a common problem that exists in many new multi-disciplinary research ventures [1,3]. For the purpose of this study, we therefore decided to avoid multiple potentially confusing concepts and focus on using the core concept of "integrative research" (*i.e.*, combining inter- and transdisciplinarity) [1] to frame our work.

After the workshop introduction, breakout groups were formed including academics from different disciplinary background. Their task was to think of research questions and needs that could potentially be developed into integrative research projects. This process highlighted three key elements as being fundamental for effective collaboration. These were: (i) developing a mutual understanding of the problem, the research aims and questions to be addressed; (ii) the ability to integrate multiple scales of investigation; and (iii) developing a robust research framework around the issues to be addressed. Another result of this exercise was the realization that many potential barriers (e.g., limited time and differences in understanding) were present that could potentially affect successful project development. This last finding encouraged this study.

In the final phase of this workshop, it was agreed among the academics that in order to get useful research results within the limited timeframe of the centre, the opportunities for collaborations involving all science disciplines and expertise needed to be explored further. To optimize the efficiency of this project, one person (*i.e.*, forest/landscape ecologist) was allocated to undertake this task, and on completion, report the results back to all the academics simultaneously. Together with a social scientist from the centre, an email survey was developed including questions focusing on identifying the common ground, weaknesses and strengths between the academics. An email survey was used to reach all academics ($n = 27$) spread out across the different institutions and countries.

The aim of this project was to reveal the potential barriers, common ground and individual research strength between the academics in order to initiate collaborations and research projects within the centre. We tackled this by looking for differences and similarities between academic perspectives by asking questions on: (1) definitions of commonly used themes related to climate change, woodland, and forest health; (2) the spatial and temporal scales used in their research; and (3) how they address climate change in their work. This approach was similar to Eigenbrode *et al*. [2], however, we took this analytical tool further by adopting a semi-quantitative analysis of the responses to reveal the differences and similarities and strengths of the academics. The results were then used to facilitate discussions with centre academics to raise awareness and create a dialogue around these issues.

For (1), academics were asked to give a short (<25 words) definition of ten commonly used themes. The choice of these themes was based on their occurrence in the centre" program challenges and objectives (see further www.foresthealth.com.au [15]). The themes were: *Climate; Climate change; Scale; Scale of investigation; Woodland; Forest; Stress; Stressed tree; Woodland/forest decline; and Woodland/forest health*. For (2), academics were asked about the spatial and temporal scales of investigation they used in their climate change related research, and for (3) academics were asked to explain how their work was contributing to a better understanding and management of the effects of climate change on forested ecosystems. A maximum combined word limit of 200 was used for questions (2) and (3). The word limits were implemented to increase the response turnaround and speed-up the data processing and analysis.

To analyze the responses, a semi-quantitative content analysis approach was used following steps described in Stemler [21]. These survey responses were analysed using an emergent coding technique. Following a preliminary examination of the responses, this technique identifies categories (*i.e.*, recurring words or word combinations and their synonyms), and quantifies the number of respondents using these categories in their responses. For question (1), emergent categories for each theme provided the basis for tabulating counts that were grouped for each individual research program. This resulted in a table that was used to easily present and identify the differences and similarities in definition between the academics working within the different research programs. For (2), the emergent categories for the scales of research were defined as (i) spatial scales relating to the physical size of the area or community, or the object being investigated, and (ii) temporal scales relating to the time spend on the investigation and/or the temporal dimension of the datasets used (e.g., time-series). Spatial scales were categorized as: large (country, state, region), medium (local communities, and individual national parks or reserves) and small (single trees or stand of trees <5 ha, households, individual people). Temporal scales of study were identified as: long (data spanning >5 years), intermediate (2–5 years), and short (<2 years). These spatio-temporal scale categories were used to produce bar charts representing counts that were grouped for each individual research program, giving an easy overview of the differences and similarities within and between the different research programs. For (3), academics were categorized based on the perceived contribution of the research to: (i) a deeper understanding of critical basic processes and relationships (climate, physiology, people); (ii) the prediction of possible outcomes of changes (modeling); and (iii) informing managers, policy makers, local communities and the general public (policy development, education). These categorizations made it possible to interrogate the differences and similarities in responses for all the academics across the centre.

3. Results

Three general email requests to fill in the questionnaire were sent out over a two-week period with 18 out of 27 (67%) academics responding. After another five requests targeted at academics individually, all had responded, two-and-a-half months after the first email request was sent out.

3.1. Definitions of Themes (1)

Within the context of enhancing collaboration within this centre, six key observations were derived from Table 1. (i) Many similarities exist between academics in the social sciences (P4) and the natural sciences programs (P1-3), which suggested potential for collaborations between these two distinct fields of research. (ii) Common ground between the programs was evident in the similar definitions for "woodland" and "forest". (iii) Relative good agreement across the programs was found for "climate" and "climate change". However, an apparent difference in understanding between social scientists in P4 and the natural sciences in P1-3 was revealed for "climate change". Academics from P1, P2, and to a lesser extent P3, highlighted the importance of changes in weather-related variables compared to long-term averages. Only one academic in P4 noted this temporal element, which, however, is an essential component of climate change research. This highlighted the potential barrier of differences in understanding between these groups of academics. (iv) The "scales" definitions showed high variation within and between the programs. Considering both spatial and temporal scales is an essential element in climate change research, however, only a majority of P1 academics included both these spatial components in their definition. (v) We found largely consistent definitions for "stress" and "stressed tree" between the majority of academics across the programs. (vi) For "woodland/forest decline/health", (the primary research theme in the centre) disciplinary differences in the use of terminology became evident. Restoration ecologists (P3) clearly preferred to use "ecosystem" indicating their holistic approach, and physiologists and pathologists (P2) introduced the term "resilience" here. This indicated the potential for "language barriers" between the academics, and raised awareness of the importance of establishing a clear and ongoing dialogue to enhance collaborative project development.

3.2. Spatial and Temporal Scales of Research (2)

The differing perceptions of scale between programs as evidenced in Table 1, were similarly reflected in the responses by academics regarding the scale of their research (Figure 1). The academics in P2 focused their work at a small- to medium-scale in the short- to intermediate-term, whereas academics in the other three programs were addressing all three spatial and temporal scales. Also, a core strength of P1 academics that emerged from their responses was their ability to incorporate all scales of research more consistently and readily than researchers in the other three programs.

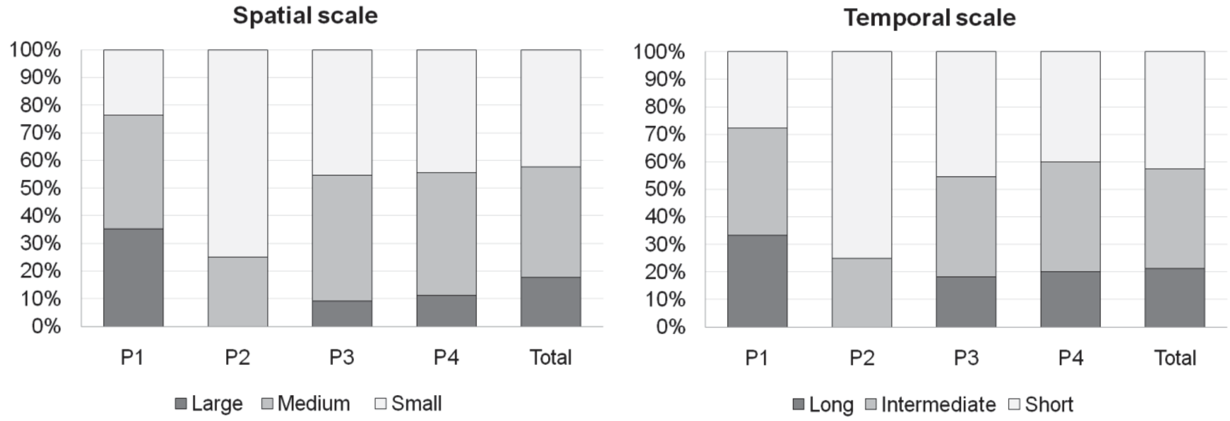
Table 1. Themes and emergent classification derived from the individual responses of the academics working in the centre (*n* = 27) Theme: word(s) that were queried. Classifier: words and descriptions used by the respondents in their definition for the themes queried. P1–P4 refers to the individual centre programs. P1: Process and ecosystem modeling, P2: Decline ecology; P3: Restoration ecology; P4: People, policy and implementation. The column indicating the percentage (% = (Total/Total responses) × 100) sometimes exceeds 100% as respondents frequently used multiple classifiers.

Theme	Classifier	P1	P2	P3	P4	Total	%
Climate	Total responses	8	8	6	5	27	
	Weather or related variables, long-term average or experienced over time	3	7	3	3	16	59
	Weather or related variables	5		3	2	10	37
	Conditions (related to weather) at a certain place	2	4	2	3	11	41
Climate Change	Total responses	8	8	6	5	27	
	Change in weather or related variables compared to long-term average or over time	6	7	3	1	17	63
	Change in (average) weather or related variables	2	1	3	4	10	37
	Change in conditions (related to weather) at a certain place			1	2	3	11
Scale	Total responses	8	8	6	5	27	
	Spatial and temporal (*i.e.*, space and time)	6	1	1	2	10	37
	Spatial (*i.e.*, size of area)	2	4	2	2	10	37
	Measurement unit or level		3	3	1	7	26
Scale of investigation	Total responses	8	8	6	5	27	
	Spatial and temporal range of study	5	1	1	1	8	30
	Spatial range of study	2	3		2	7	26
	Level or measure of detail		1	2	1	4	15
	Depends on question asked	1	3	3	2	9	33
Woodland	Total responses	8	8	6	5	27	
	Few trees with an open canopy	8	8	6	4	26	96
	Small group of trees				1	1	4

Table 1. *Cont.*

Theme	Classifier	P1	P2	P3	P4	Total	%
Forest	Total responses	8	8	6	5	27	
	More (large) trees (compared to woodland) with a closed canopy	6	7	6	4	23	85
	Large group of trees	1			1	2	7
	Tree dominated ecosystem	1	1			2	7
Stress	Total responses	8	8	6	5	27	
	A factor affecting or decreasing health or functioning	7	7	4	2	20	74
	Responding to or coping with a pressure or change	1	1	2	3	7	26
Stressed tree	Total responses	8	8	6	5	27	
	Affected or decreased state of health or functioning	4	7	3	2	16	59
	Showing physical or chemical signs of stress	6	2	2		10	37
	Responding to or coping with a pressure or change			1	3	4	15
Woodland/forest decline	Total responses	7	8	6	4	25	
	(Process of) an (eco)system getting less healthy or disappearing	1	2	5	3	11	44
	(Process of) trees or species getting less healthy or disappearing	5	3	1		9	36
	Decreasing resilience or balance		2		1	3	12
	Decreasing intrinsic value	1				1	4
	Increasing signs of stress		1			1	4
Woodland/forest health	Total responses	7	7	6	4	24	
	A measure of functioning or state of condition of the (eco)system	5	1	6	4	16	67
	(Eco)system resilience (to fluctuations)		5			5	21
	Not ill/sick or vigorous	1	1		1	3	13
	High intrinsic value	1				1	4

Figure 1. The scales of investigation used in the forest related research undertaken by academics within the centre (n = 27). For scale levels, see Methods.



3.3. Engagement in Climate Change Research (3)

The majority of academics perceived their contribution to climate change research as providing a deeper understanding of critical basic processes in terms of people, trees, woodland and forest functioning (87%), showing an essential common research ground between the different academics. For instance, the academics highlighted "*focusing on understanding basic relationships within the current weather and climate regime*", generally because of the view that "*we can't understand the effects of climate change unless we first understand the basic processes*". A further important joint contribution was providing knowledge aimed at helping and informing the community, managers, and policy makers (83%). For instance, the academics aimed at "*how best to empower people to act, change their relevant behaviors, and interact positively with climate change*". Predicting the possible outcomes of climatic changes was the sole domain of P1 academics (22%). Additionally, a core strength of P4 academics emerging from their responses and actions was found to be their active involvement in bringing the academics from the different programs together to stimulate discussion and interactions (e.g., by organizing the initial 1-day workshop), facilitating the process of developing mutual understanding and respect.

The results were presented and discussed at a monthly centre meeting, and further distributed among the academics via email. The information was used by the individual academics to get a better understanding of each other's research views and strike up further collaborations at the 1–2 monthly meetings that were organised. Academics were further invited to participate in the writing of this article to further enhance the interactions between the different disciplines and continue the dialogue. Although we cannot quantify the direct effect of our approach on the development of collaborations between the researchers in our centre, we could interpret the 100% response to the survey, and more importantly the development of four additional collaborative research projects after the survey results were presented, as modest indicators of success. These four collaborative projects have already resulted in several knowledge outputs with contributions from a broad disciplinary mix of academics from the natural sciences [17,19], collaborative contributions from academics working together with non-academics [18], and contributions involving collaborations between the social and natural sciences [22]. Additionally, the writing of this paper was also a collaborative effort, with academics from all four programs involved. Together, these results indicate that our approach was successful in fostering collaborative research between the academics, particularly within the limited time frame of the centre.

4. Discussion

Many papers have analysed the potential barriers to developing integrative research programs in landscape-scale research after the projects were finalized (e.g., [3,10,12,13]). Few studies, however, have presented strategies to identify ways to develop and progress integrative research projects within short-term research organizations in the process of starting up. This study contributes to filling this knowledge gap by presenting a promising approach to foster collaborations towards integrated research development, by identifying potential barriers, and more importantly the common ground, and strengths of academics working in a short-term multi-disciplinary forest focused research organization. A questionnaire and subsequent response analysis were the essential components to create a better mutual understanding resulting in more collaboration. The great benefit of this approach was the opportunity to use the findings to improve and foster research practice in the current centre as well as sharing these results through this manuscript to benefit practice elsewhere.

Forest research initiatives addressing global environmental issues at the landscape-scale have become increasingly more important. Given that global change processes are affecting forested ecosystems at multiple scales across societies, a multi-scaled integrative research approach is needed [5]. Deconchat *et al*. [9] showed the value of such a multi-scaled socio-ecological approach in generating cross-disciplinary new knowledge. They showed that to improve and understand biodiversity management of privately owned woodlots in a fragmented agricultural landscape, research should include both ecological and sociological approaches at different spatial and temporal scales. For instance, a clear relationship was found between historic/current agricultural practice and the biodiversity value of the individual woodlots across the landscape. This finding was only possible by combining findings from work conducted by scientists from both the social and natural sciences. This indicates the importance of combining expertise of multiple research disciplines for providing a deeper understanding of the underlying change processes, resulting in better management guidance [9].

Our specific approach revealed some of the likely barriers for the development of integrative research in the centre. The analysis of definitions revealed the likely barrier of different understandings of key research themes, such as "climate change", and the use of different terminology for defining woodland and forest health/decline. These "language barriers" have also been found as an impediment to integrative research development in earlier studies (e.g., [3,10,12]). For instance, Jakobsen *et al*. [10] found that two project teams investigating management issues acting across two large geographical areas were both struggling with the different use of terminology between disciplines. In one case, it was found more successful to try to understand each other's "language" than to try to get consensus over a shared definition. This is contrary to studies that recommended developing a "common language" including the development of a set of shared definitions [3,12,14].

This process of developing a "common language", was found to be highly time consuming [3,12]. This time constraint was widely recognized among the centre's academics, and a shared definitions list for the themes that were queried was therefore not attempted. Instead, the tabled results were used to provide the opportunity for academics to explain their views and clarify their thinking. This process created the essential mutual understanding necessary for promoting further collaborations.

As well as identifying potential barriers, the results suggested strong potential for collaborations within the centre. For instance, Table 1 indicated areas where mutual understanding was already well established, highlighting the potential for collaborations between both natural and social sciences. This potential was further highlighted by the similarities in the responses to the perceived contribution of the individual academics to the research agenda of the centre. There were clear mutual research aims and directions towards developing: (i) a deeper understanding of critical basic processes in terms of people, trees, woodland and forest functioning, and relating these to the impacts of climate change; and (ii) providing information and advice to the community, managers, and policy makers to help improve woodland and forest management. These themes were further explored and discussed during and after the feedback session, and subsequently developed into the four additional research projects.

The survey also revealed specific disciplinary strengths and this knowledge was exploited in further collaborative project development. In our study, the majority of academics were performing their research at one or two spatio-temporal scales only (Figure 1). Understanding climate change necessarily relies, however, on knowledge of changes investigated across the full range of spatial and temporal scales, *i.e.*, from short to long timeframes and from local to global spatial scales. Particularly ecosystem modelers were found to have the tools to incorporate this full range of spatio-temporal scales in their work.

Modelers were equally identified as providing the means and methods for integrating research results by Milly *et al.* [23]. Natural and social science disciplines are often constrained by short-term data collection, and therefore unable to incorporate long and large spatio-temporal scales in their projects. Modelers, however, with their capacity to integrate research results gathered at different spatio-temporal scales, may be able to provide the means to produce the integrated knowledge and associated practical solutions so critical to the success of understanding and acting on global change processes. This potential was recently shown in two landscape-scale studies performed under the umbrella of the centre by Brouwers *et al.* [17,18]. These studies successfully integrated data collected at different spatio-temporal scales to reveal the likely climate and landscape drivers behind the observed declines in tree health across the southwest of Western Australia.

The questionnaire responses and previous activities (e.g., 1-day workshop organization), showed that the social scientists were actively initiating and facilitating the development of collaborative research within the centre and with external stakeholders. Social scientists (and landscape ecologists) were equally found to promote communication and collaboration between academics from different disciplines in the study by Jakobsen *et al.* [10]. Social scientists were further noted for their leadership skills and broader experience in developing integrative research projects [10,13]. These research strengths were highlighted in the feedback and subsequent brainstorm sessions following this study, resulting in the involvement of social science academics in three of the four additional collaborative projects that were developed within the centre. Collaborations and integrative research are critical for finding ways of coping with global environmental change [5,22], and including social science expertise is not only imperative [24], but is likely to enhance the chances of success.

The approach we adopted was aimed at making the critical first step of breaking down the boundaries that exist between different research disciplines. Our self-assessment approach opened the door to the potential development of integrative research projects. This approach can be adopted by any organization that aims to combine expertise from multiple disciplines in the pursuit to tackling a common problem. In addition to the approach we present appearing to be successful in fostering collaborations, we also have some indications that the approach succeeded in creating new integrated knowledge. One example is the research conducted by collaborating social scientists and restoration ecologists looking at the attitudes of restoration volunteers toward conservation in a changing environment [22]. Together they revealed that volunteers can be a valuable source of knowledge and ideas. Volunteers' awareness and knowledge of the complexities related to environmental change and forest restoration stems from hands-on day-to-day experience [22], which can be an important source of information in the development of successful restoration projects in our rapidly changing climate. This knowledge would not have developed if the social scientists and restoration ecologists had not made an effort to understand each other's research paradigms and be prepared to cross their disciplinary boundaries.

To fully assess the success of our centre in creating integrated knowledge, however, further evaluation needs to be conducted preferably at regular time intervals. Specific success indicators to be used could include the number of joint publications that emerged from the additional projects that were developed and the number of citations these generated; the number of publications produced to communicate research findings to policy makers and the general public (e.g., research bulletins; [25]); the number of people subscribing to social media and other information outlets (e.g., [26]); the level of involvement by the public in new projects (e.g., [27]); and, for instance, the number of new academics (e.g., Ph.D. students) obtaining integrative skill sets. After the process of fostering collaborations, these and other indicators (e.g., [28]) could and should be used to further monitor and evaluate the success of research ventures that are aiming to develop integrated knowledge.

5. Conclusions

Initiating a centralized effort to identify differences and similarities between academics provided a useful basis to explore and foster collaborations and the potential development of integrative research projects. Given the urgency of addressing global change issues and the importance of integrative research for the success of this enterprise, we have to rapidly improve our practice in this area, and this study makes a contribution in doing so. The Western Australian Centre of Excellence for Climate Change, Woodland and Forest Health benefited from the approach that was taken, and our findings are potentially of broader benefit to similar research initiatives elsewhere.

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Conflict of Interest

The authors declare no conflict of interest.

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