PLANT BIOSECURITY
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Review of community engagement in biosecurity and NRM learning materials

Charles Darwin University ENV521 Master's Unit (PBSF014)

August 2019

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This document should be cited as:

Stenekes, N, Kruger, H 2019, Review of community engagement in biosecurity and NRM learning materials, ABARES project report prepared for Charles Darwin University, Canberra, August. CC BY 4.0.

Acknowledgements

The authors thank Charles Darwin University for guidance and participation for this review of the unit material. Thanks to our project partners for their willingness to allow material arising from past projects to be shared with students in the master's course. We are also grateful to the Plant Biosecurity Science foundation (PBSF014) for providing a funding contribution towards the review project.

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Executive summary

This report summarises outputs from a review conducted of the '*ENV521 – Community Engagement for Biosecurity and Natural Resource Management*' master's unit, which is run by Charles Darwin University (CDU) and forms part of the national curriculum for biosecurity.

CDU expressed interest for the ABARES Social Sciences team to review the current unit with the objective of updating it to include the latest academic literature about behaviour change and on approaches for involving communities in biosecurity and natural resource management. There have been many new insights into the application of behaviour change models and methods for gaining community support that have come to the fore in recent years, and these approaches can be used to strengthen the education of new biosecurity and natural resource management (NRM) professionals.

ABARES Social Scientists worked collaboratively with Dr Penny Wurm, the CDU master's course co-ordinator, to identify the priority areas for reviewing the unit. The three areas of focus were: course topics, engagement tools and case studies. The output of the review is a series of recommendations for strengthening these areas in the Unit for CDU students starting in Semester 2 2019.

A number of the recommendations have been incorporated into the unit to date:

- a module of materials has been incorporated on monitoring and evaluation approaches that can be applied to community engagement activities
- the case study collection available for students to access at any time was expanded, with supporting learning materials integrated into the case studies
- the section of the unit on 'Engagement' has been strengthened by making available additional engagement tools and approaches.

The unit co-ordinator provided feedback that material from the new case studies, and suggested unit topics and tools will continue to be incorporated into weekly learning activities. These changes and some of those planned in the future are noted in the relevant sections of this review report.

The benefits of the collaboration between CDU and ABARES in reviewing the unit material were:

- The material provided valuable intellectual and practical input to the unit by not only recommending new references, but embedding those references in the context of specific case studies. These case studies were based on ABARES' in-house documents that would not otherwise have been available.
- The collaboration highlighted the value of curriculum materials as a mechanism for fostering research uptake by targeted research users.
- Feedback from the unit co-ordinator was that participating in the collaboration project was a stimulating process, which will inevitably impact on the approach to thinking about and teaching the unit.
- Unit development is an iterative process, so the review report provides rich new resources for an ongoing process of continuous unit renewal.

1. Introduction

This report summarises outputs from a review conducted of the '*ENV521 – Community Engagement for Biosecurity and Natural Resource Management*' master's unit, which is run by Charles Darwin University (CDU) and forms part of the national curriculum for biosecurity.

CDU expressed interest for the ABARES Social Sciences team to review the current unit with the objective of updating it to include the latest academic literature about behaviour change and on approaches for involving communities in biosecurity and natural resource management. There have been many new insights into behaviour change and methods for gaining community support that have come to the fore in recent years, and these approaches can be used to strengthen the education of new biosecurity and natural resource management (NRM) professionals.

The output of the review is a series of recommendations for strengthening areas in the Unit for CDU students starting in Semester 2 2019. The review report provides resources which can be continuously incorporated into the unit. A number of the recommendations have been incorporated into the unit to date. These changes and those planned are noted in the relevant sections of this review report.

This course is also undertaken by some Murdoch University students who are undertaking biosecurity studies. Ultimately, this will better equip new biosecurity and NRM professionals to deal with the challenges and opportunities of involving the community in biosecurity and NRM.

2. Approach

ABARES Social Scientists worked collaboratively with Dr Penny Wurm, the CDU master's course co-ordinator, to identify the priority areas for reviewing the unit. There were three areas of focus: topics, engagement tools and case studies.

This summary report contains recommendations for updating the course material as follows:

- **Topics**: suggested new topics and related resources that could be incorporated into the existing course material
- **Engagement tools**: suggested new community engagement tools/methods
- **Case studies**: additional case studies that illustrate the application of a tool, method or topic that can inform or develop student skills or knowledge
- **Reference list:** of all new resources (including **Endnote library file** and **PDFs**).

A key part of the focus was to broaden the community engagement toolbox available to biosecurity and NRM professionals, including explanations of what circumstances and when the tool(s) are most appropriate. New tools added were based on a literature review, including of approaches that have received increasing attention in recent years such as behavioural economics and nudge theory, and relevant recent ABARES research.

The approach used by ABARES to make these recommendations and assist in updating the course material for Unit ENV521 was:

- review the existing CDU course material and unit information via the Online Learning System ('Learnline')
- identify recent literature on community involvement in biosecurity and NRM, with a particular focus on literature since 2010 and to;
  - assess relevance of these resources for any new topics, engagement tools or case studies for the unit[1]
- assess current and past ABARES social research and project material for any learnings about community engagement in biosecurity and NRM that could extend student skills, and identify and prepare a number of case studies from these.

This process was supported by a number of discussions with Dr Penny Wurm about the areas of focus and ways of integrating the new material into the existing course curriculum. The new material should be viewed as a series of recommendations from which CDU has chosen to incorporate, and will further adapt, all or a sub-set of suggestions depending on requirements.

[1] Search terms that were used in the literature review included, "behavioural economics"; "nudge theory"; "social marketing"; "community engagement biosecurity"; "community engagement natural resource management"; "community-based natural resources management".

3. Review of course topics

A summary of the existing course material set out in weekly format below for the 12 weeks of the term. There are three main unit sections: **Community; Ethical practice; Engagement tools**.

Activities covered in each week are listed in dot points. Each activity contains commentary and discussion points guiding student's thinking and skill development with reference to relevant resources (readings). Proposed new topics are listed the tables below in column 2 **(see Appendix 1 for topic details)**. Implemented changes to the curriculum are noted in column 2 with a tick (✓) symbol. Other materials will be integrated iteratively.

The current sequence of the 'community' section (weeks 1-4) is as follows.

Table 1 'Community' course material

Existing topics	Suggested new topics (see Appendix 1 for details)
Week 1: Community • Orientation • Kununurra case study • Defining community • Community capability • Sharing initial responses	• Working with different knowledge systems and institutional logics (Topic A) • What influences people's support for a biosecurity or NRM initiative? (Topic B)
Week 2: Community (cont.) • Stakeholder analysis for biosecurity • Characterising stakeholders	• Understanding social networks, including working with trusted figures (Topic C) • Stakeholder analysis – more resources (Topic F)
Week 3: Community (cont.) • Who are your stakeholders? • Salience and public participation – the 'innovation diffusion' model and networks • Appropriate governance structures	• Biosecurity socio-politics - for enthusiastic students (Topic G) • Extend concept of diffusion to include approaches such as participatory research and/or agricultural innovation systems (AIS) thinking for some contexts (Topic K) • Could touch on social networks for understanding structural roles and positions in natural resource management and biosecurity (Tool F)
Week 4: Community (cont.) • Biosecurity strategies open for public comment • Some guidelines for engaging communities	
Assessment 1 – Stakeholder analysis report for a plant biosecurity scenario (due Week 5) containing circumstances; methods used; results; discussion; and recommended actions arising from the stakeholder analysis.	**Various additional case studies available in Appendix 3.** ✓ The Black Sigatoka case study has been provided as context in the Case Study collection, and the key reference for that case, McAllister et al. (2015), has been included as a reading activity in week 3, and used to inform Assessment 1 preparation. ✓ The other 6 case studies are all being added to the learning materials in the Case Study collection, for student to access at any time.

The current sequence of the 'ethical practice' section (weeks 5-6) is as follows:

Table 2 'Ethical practice' course material

Existing topics	Suggested new topics
Week 5: Ethics • Ethical imperatives for community engagement • Good community engagement (what does it mean?) • Difference (responding to difference)	• **Case study 5 Asian Honey Bee** could be a basis for discussion of values and principles underpinning 'good' community engagement.
Week 6: Ethics (cont.) • Democratic principles and failure • Examples of ethical guidelines and protocols	
Assessment 2 – Ethical rationale for community engagement (due Week 7).	

The current sequence of the 'engagement tools' section (week 7-12) is as follows.

Table 3 'Engagement tools' course material

Existing topics	Suggested new topics
Week 7: Engagement tools • engagement as empowerment (goals of engagement) • education as an engagement tool • communication networks in rural communities • empowerment vs 'adoption'	• Additional resource – Curtis et al (2014) about lessons from the Landcare movement and empowerment.
Week 8: Engagement tools • Returning to Kununurra (see how the community was constituted) • Who's in the community – rural appraisal tools	
Week 9: Engagement tools • deliberative democratic processes (tools) • rhetoric to reality? – a good question (when to use participatory democratic tools)	• Ensuring engagement is fit for purpose (Topic E). Also refer to case studies which apply methods of community engagement to a situation ('fit for purpose'), particularly Case study 4 Black sigatoga. • Cross link with the Behavioural Prioritisation Matrix, a tool to select useful approaches to communicating with and engaging the community (Case study 2 **wild dogs** and Case study 3 **biofouling**)

	• Additional resources on forms of engagement which are not deliberative nor democratic per se, such as behavioural economics (**Topic H**), 'nudge theory' (**Topic I**), and social marketing (**Topic J**) for interested students.
Week 10: Engagement tools • information and extension tools • pause and reflect on overall process	• Monitoring and evaluation of community engagement initiatives (**Topic E**). Case studies could also be used as examples of how MERI was applied to monitor and evaluate community engagement (**Case study 1 Goodfruit** and **Case study 5 Asian Honeybee**). ✓ A new module of materials relating to monitoring, evaluation, reporting and improvement (MERI) will be added to the structure of the "Engagement" topic.
Week 11: Engagement tools • Your research (preparing presentations (Assessment 3))	
Assessment 3 – Presentation – proposal for community engagement due (due Week 11) which will constitute the report in Assessment 4.	✓ The focus of this assessment has been modified. Previously, it was a student presentation that describes the community engagement plan. Presentations will now be used as an opportunity to explore how the community engagement initiatives will be monitored and evaluated for their impact or effectiveness (**Topic D** Monitoring & evaluation of community engagement initiatives). • Link with **Tool B** Program Logic (PL) Workshop. Examples of application of PL available in **Case study 1 Goodfruit** and **Case study 5 Asian Honeybee**.
Assessment 4 – Community engagement plan for a scenario (due Week 14) including introduction, rationale, comprehensive stakeholder analysis and recommended approach, tools and justification for their selection.	

4. Suggested engagement tools and methods

Novel community engagement tools and methods suggested for inclusion into the course material are:

- Rapid Appraisal of Agricultural Innovation Systems (RAAIS)
- Program Logic Workshop
- The monitoring, evaluation, reporting and improvement (MERI) Framework
- Behaviour prioritisation matrix
- Message framing
- Social network analysis

Details about the tools and methods including what they involve, when to use it, and the outcomes for students and supporting references are in **Appendix 2: Community engagement tools/methods list**.

5. Suggested new case studies

Additional case studies about community engagement in biosecurity, invasive species or natural resource management suggested for inclusion into the course material are:

1. Goodfruit community monitoring network
2. Wild dog management for peri-urban communities
3. Recreational boat biofouling management
4. Black Sigatoka eradication and community engagement
5. Evaluation of Asian honeybee community engagement activities
6. Golden Kiwi fruit bacterial canker social and economic impacts

Other potential case studies, provided with references only:

7. Marine pest stakeholder engagement (*no materials provided, apart from the suggested references in Table 4*)
8. Different perspectives on an invasive species *(no other materials provided, apart from the suggested reference in Table 4)*

Details of the themes of the case studies, how they could be used in the unit and any permissions in relation to use of the material are indicated in Table 4.

At the time of preparing this review report, the Black Sigatoka case study had been incorporated as context into the Case Study collection, and the key reference for that, McAllister et al. (2015), has been included as a reading activity in week 3, and used to inform Assessment 1 preparation.

The other case studies are being added to the learning materials in the Case Study collection, for students to access at any time. Feedback from the unit co-ordinator is that recommended materials from the case studies, suggested unit topics and tools will gradually be integrated into in the weekly learning activities for all major topics of “Community”, “Ethical practice” and “Engagement”, in 2019 and also in 2020.

Table 4 Details of case studies

Name	Key themes	Resources	Remarks
(Case study 1) Goodfruit community monitoring network	– Evaluation of a pilot program of community engagement in a tropical fruit growing region in Queensland. – How to engage, including recruiting and maintaining commitment of, volunteer community members to do pest monitoring – When and how to use engagement methods with the community, e.g. district newspaper articles, workshops – Monitoring Evaluation Reporting & Improvement (MERI) framework was used to monitor and evaluate how the pilot went, including participant interviews, program logic planning workshop, volunteer meetings with 'exit' surveys.	See the Stenekes & Please (2012) review of the volunteer monitoring pilot program [anonymised]. Key advice arising from this review that relates to involving volunteers in biosecurity programs are summarised in Kruger et al (2012). The MERI framework 'how to' guide for evaluating community engagement in biosecurity projects is available in Kruger (2012). Link to materials	This could be used as an alternative scenario for **Assessments 3 & 4** for developing students' skills around proposing an appropriate community engagement strategy. Students can develop skills in selecting an appropriate approach and using methods to evaluate community involvement in biosecurity projects or programs. Permission to use the ABARES review report (Stenekes and Please 2012) as training material for master's students of CDU ENV521 was granted (on 4/2/2019) by the industry association that partnered with ABARES on the project.
(Case study 2) Wild dog management for peri-urban communities	– Communities might not be prepared to do what experts recommend as the best way to address a particular pest, weed or disease issue. In order to make progress there is need for aligning what the community is prepared to do with scientific recommendations. – This is an example of a behavioural economics approach (specifically, the Community-Based Social Marketing (CBSM) component– Behaviour Prioritization Matrix (BPM)), which can be used to identify the most effective behaviours and that the general public can undertake for managing wild dogs.	Patricia M. Please, Donald W. Hine, Petra Skoien, Keri L. Phillips & Iain Jamieson (2018) Prioritizing community behaviors to improve wild dog management in peri-urban areas, Human Dimensions of Wildlife, 23:1, 39-53. Link to materials	An alternative scenario that could be used for **Assessment 1: stakeholder analysis**.
(Case study 3) Recreational boat biofouling management	– Communities might already be practicing best biofouling management practices. Knowing what contribution different segments of a community contribute to the biosecurity risk is a key contribution of this case study. Only then can you design interventions that will work. – A second example of Community-Based Social Marketing (CBSM) in a marine biosecurity context.	McKenzie-Mohr various references (e.g.McKenzie-Mohr and Wesley Schultz 2012; McKenzie-Mohr and Schultz 2014; McKenzie-Mohr et al. 2011; McKenzie-Mohr 2011); and the ABARES (2018) Recreational boat operators' self-management of biofouling, technical report, which applies aspects of the CBSM approach to biofouling management behaviours. Link to materials	Could be an alternative scenario for **Assessment 1: stakeholder analysis**. Possible basis for discussion about how to identify stakeholders and their role in a biosecurity issue (marine pest hitchhikers on boat hulls) and how to contact 'hard to reach' human populations.

Name	Key themes	Resources	Remarks
(Case study 4) Black Sigatoka eradication and community engagement	– Example of what local ownership and a strong community engagement program can achieve. – Utility of social network analysis to understand the structure of governance and how this can impact on the ability to engage people and respond.	ABARES' Biosecurity Engagement Guidelines: Principles and practical advice – See: A toolbox on Tully. McAllister et al. (2015) on a social network analysis of who manages plant pest and disease outbreaks. Link to materials	Illustrates how community engagement can successfully be designed to achieve a particular purpose and fit a set of circumstances. Also, explores how social network analysis can be used to understand the importance of 'institutional fit' and engagement across scales.
(Case study 5) Evaluation of Asian honeybee community engagement activities	– Techniques for designing and collaboratively evaluating community engagement components of an eradication program.	ABARES report prepared in partnership with Biosecurity Queensland (Feb 2011). Link to materials	Possibly explore ethical and practical considerations around researchers partnering with program lead agency in an evaluation of community engagement activities. Permission to use ABARES Honeybee review report as master's student training materials granted by Biosecurity Queensland (17/4/2019).
(Case study 6) Golden kiwi fruit bacterial canker social and economic impacts	Interesting themes in this case study are: – Explicit social criteria were included in the aims of the response to the outbreak ('minimise risk of suicides' of affected communities) – Demonstrated a private industry and government collaboration – Leveraged both national and international stakeholders to try and increase the speed and improve the response to the outbreak – The industry worked with different levels of government to reduce impacts of the outbreak on farmers – The industry also worked with the finance industry to mitigate the threat of divestment	Link to materials	Possibly include as a way of exploring social and economic impacts of responses to emergency outbreaks. We have not identified **social impact assessment** as a tool in this review, but it could be included. This could also be included as a case study option for the stakeholder analysis (**Assessment 1)** for those students interested in this topic.

Table 4 (cont.) Other potential case studies

Name	Key themes	Resources	Remarks
(Case study 7) Marine pest stakeholder engagement	– Students are presented with two articles of community engagement in relation to marine pests; one successful the other not. – Suggested questions could focus on: • What do you think are the main reasons that the outreach campaign in Western Australia (WA) succeeded but not in Tasmania (TAS)? • How can the outreach campaign in TAS be improved?	Campbell et al., (2017b) Hourston et al., (2015)	Some reasons why the outcomes were different: The WA crab general surveillance was done in conjunction with an active surveillance initiative, so the visibility of government staff and trapping gear may have given more legitimacy to the messages. Recreational fishers may only have witnessed government staff. The WA case study had a wider and more diversified engagement strategy, including personal contact between government staff and fishers and at community events WA flyer included several photos of invasive and native crabs with diagnostic features highlighted. Program longevity: the WA program ran since 2012 Improvements for TAS: • Review signage to include native species that are commonly mistaken for NIMS • Test signage with target group • Enlist support from staff or volunteers to engage with recreational users at peak times to increase their awareness and capability • Broaden the campaign to also include radio talks, media releases, stalls at community events, etc.
(Case study 8) Different perspectives on an invasive species	– Buffel grass is valued by pastoralists but it harms the environment.	Marshall et al (2011)	Could use buffel grass as a case study, guided by the article by Marshall et al, as a basis for students to consider the different ways that people regard an invasive species and the implications for community engagement. We haven't provided case study material for this potential case study, as the article by Marshall is very accessible. But it could be a potential case study option for the stakeholder analysis task (**Assessment 1**).

7. Reference list

This is a full list of all the additional resources suggested as course material.

The hyperlinks to public URLS for online retrieval are embedded in the in-text citations in the relevant sections of this report. As part of the outputs for the review of the course, an Endnote reference list with PDFs attached were provided to CDU.

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Appendix 1: New topics list

Suggested topic	Key points	Suggested resources	Possible place in unit
(Topic A) Working with different knowledge systems and institutional logics	• Different stakeholder groups hold different kinds of knowledge that need to come together to identify workable ways forward. For example, scientists may hold information about how a certain pest can be controlled, policies makers may have knowledge about what practices are acceptable for market access, whereas a local community (or its representatives) hold knowledge about what practices will work best in their context, or what messages will resonate with their group. Some groups, such as Indigenous communities, may also hold intricate local ecological and cultural knowledge. • Combining different knowledge systems is a process in which relationships and trust stand central. Knowledge brokers can play a key role in 'translating information' between groups and facilitating knowledge integration. • In addition, different stakeholder groups may have different belief systems (including assumptions and values) about how the world works that shape their behaviours and expectations, for example, in relation to biosecurity roles and responsibilities. For example, government and industry bodies may be driven by the idea of shared responsibility and partnerships (neoliberal logic), whereas farmers may be driven by the need to support	• Higgins, V, Bryant, M, Hernández-Jover, M, McShane, C & Rast, L (2016), 'Harmonising devolved responsibility for biosecurity governance: the challenge of competing institutional logics', Environment and Planning A, vol. 48, no. 6, pp. 1133-51. • Enticott, G & Wilkinson, K (Enticott and Wilkinson 2013), Biosecurity: whose knowledge counts? in Dobson, A, K Barker & SL Taylor (eds.) (2013) *Biosecurity: the socio-politics of invasive species and infectious diseases* Routledge. • Robinson CJ, Wallington TJ (2012) Boundary work: engaging knowledge systems in co-management of feral animals on indigenous lands. Ecol Soc 17(2):16	• Possibly part of **Week 1** (maybe after community capability) or as part of **Weeks 2 & 3** stakeholder analysis ✓ Added reading material (papers by Higgins et al. 2016 and Robinson and Wallington 2015) to inform Assessment 1 preparation, during "Community" weeks learning materials. Used a paraphrased version of the Key points, to introduce reading. Have developed a reading guide of key questions about these readings.

	commercial viability (productivist logic) or have a belief that government have a moral responsibility to support farming as it sustains society (agrarian logic). • Overlooking different institutional logics and knowledge systems in engagement processes may lead to a loss of legitimacy, increased tension and/or lack of support.		
(Topic B) What influences people's support for a biosecurity or NRM initiative?	• Achieving behaviour change is a key aim of most biosecurity and NRM engagement programs • The reasons why people support an initiative or not can be complex, including how people perceive a particular pest, weed or disease and its impacts • Education and awareness-raising campaigns will always play a key part in involving the community in biosecurity and natural resource management. Due to the complexity of what influence people's behaviour they need to be developed with great consideration and preferably in conjunction with other activities to establish trust.	• McLeod, LJ, Hine, DW, Please, PM & Driver, AB (2015b), 'Applying behavioural theories to invasive animal management: towards an integrated framework', *Journal of Environmental Management*, vol. 161, pp. 63-71. • Shackleton, RT, Richardson, DM, Shackleton, CM, Bennett, B, Crowley, SL, Dehnen-Schmutz, K, Estévez, RA, Fischer, A, Kueffer, C & Kull, CA (2019), 'Explaining people's perceptions of invasive alien species: A conceptual framework', *Journal of environmental management*, vol. 229, pp. 10-26. • Curtis, A, Ross, H, Marshall, G, Baldwin, C, Cavaye, J, Freeman, C, Carr, A & Syme, GJ (2014), 'The great experiment with devolved NRM governance: lessons from community engagement in Australia and New Zealand since the 1980s', Australasian Journal of Environmental Management, vol. 21, no. 2, pp. 175-99.	• Leading up to section on 'Working with different knowledge systems and institutional logics' • Could be used in conjunction with case study based on Marshall et al (2011) on buffel grass.
(Topic C) Understanding social networks, including working with trusted figures	• Social networks enable different actors to collaborate and coordinate management efforts in NRM and biosecurity • Enlisting the support of people who are already trusted by a particular community to act as a 'go-between' has three potential key benefits in that they can act as (i) champions for a biosecurity initiative; (ii) information translators/intermediaries and/or (iii) information integrators.	• Bodin, Ö, Crona, B & Ernstson, H (2006), 'Social networks in natural resource management: what is there to learn from a structural perspective?', Ecology and Society, vol. 11, no. 2. • Robinson CJ, Wallington TJ (2012) Boundary work: engaging knowledge systems in co-management of feral animals on indigenous lands. Ecol Soc 17(2):16 • Julien D & Thomson S (2011), 'Interactive methods to educate and engage poultry producers on the importance of practicing on-farm biosecurity',	• Perhaps part of stakeholder analysis, after 'Working with different knowledge systems and institutional logics' • Note that Robinson et al (2012) is also listed above, so see where it fits best. Might need to do further searches of other resources that provide well-explained broad overview.

		Journal of Agricultural Extension and Rural Development, vol. 3, no. 8, pp. 137-40.	
(Topic D) Monitoring and evaluation of community engagement initiatives	• M&E is important to ensure community engagement programs stay on track. This includes identify issues and opportunities early on in order to respond to them • M&E will also inform effective resource allocation over time	• Kruger, H (2012), Biosecurity Engagement Guidelines: How to Develop an Engagement Strategy Including a Monitoring and Evaluation Component: ABARES. • Australian Government (2009b) NRM MERI Framework, Australian Government Natural Resource Management Monitoring, Evaluation, Reporting and Improvement Framework. • BetterEvaluation.org – an international collaboration to improve evaluation practice through sharing information and approaches	• Could be the focus of the Presentation assignment (**Assessment 3**) – to apply M&E to a case study.
(Topic E) Ensuring engagement is fit for purpose	• Engagement initiatives can have various objectives. Engagement activities therefore need to be designed with the overall objective of engagement in mind.	• International Association of Public Participation (IAP2) framework • IGAB Schedule 6 (National Biosecurity Engagement and Communication Framework)	• Possibly more use could be made of the IAP2 framework in **Week 9: Engagement tools**. IAP2 developed a spectrum of public participation, designed to assist in selecting engagement levels and the options available. • The IAP2 framework has been integrated into the Intergovernmental Agreement on Biosecurity (IGAB) Schedule 6 (Engagement and communication)
(Topic K) Participatory research / agricultural innovation systems thinking	• The concept of 'diffusion of innovation' could be extended to also include approaches such as participatory (action) research and/or agricultural innovation systems thinking for some contexts	• The article by Schut & Klerkx et al (2018) on Innovation platforms: Synopsis of innovation platforms in agricultural research and development is an accessible description of what innovation platforms are and the circumstances in which they are likely to succeed. • Web video What is participatory research? of Prof Melanie Nind explaining why it is important to involve affected groups in the research process (by Sage Research Methods Space series); and also Nind , M. 'The practical wisdom of inclusive research' (2017) Qualitative Research Vol 17 Issue 3, paper in the context of action research with people with learning disabilities.	• Could extend the diffusion of innovation to introduce students to alternative models of attitude formation • Agricultural innovation systems thinking focusses on how development outcomes can be achieved through 'innovation platforms', which are like communities of practice. Basically, this is stakeholders getting together negotiating, collaborating and overcoming challenges. This is an alternative approach for thinking about ways of diffusing ideas and finding solutions to problems especially when uncertainty and complexity are high.

			• Possibly also show the students this video from Sage featuring Prof Melanie Nind, explaining what participatory research is, and why it is beneficial to involve the affected community in the research process.

Additional resources

Existing topic	Resources	What it is about	Remarks
(Topic F) Stakeholder analysis – more resources	Novoa, A et al. (2018) A framework for engaging stakeholders on the management of alien species. J. Environ. Manage, 205, pp. 286-297 Reed et al (2009), 'Who's in and why? A typology of stakeholder analysis methods for natural resource management'	These references provide frameworks for stakeholder engagement, including co-design of a management strategy, ways to assist stakeholders to take more ownership of an issue and monitoring and evaluation. Contains various case studies (albeit from South Africa) that could be useful.	More resources for stakeholder analysis.
(Topic G) Biosecurity socio-politics	Link to online book: https://www.book2look.com/embed/9781136285509	Presents biosecurity as a governance approach to a set of concerns that span the protection of indigenous biological organisms, agricultural systems and human health from invasive pests and diseases. Describes the ways in which biosecurity is understood and theorized in different subject disciplines, including anthropology, political theory, ecology, geography and environmental management. It examines the different scientific and knowledge practices connected to biosecurity governance, including legal regimes, ecology, risk management and alternative knowledges.	For really enthusiastic students who want to explore the different perspectives, disciplines and practices on biosecurity.

Existing topic	Resources	What it is about	Remarks
(Topic H) Behavioural economics	The article by Barnes et al (2015) reviews the evidence relating to the effect of compensation on biosecurity behaviours and on the frequency of animal disease reporting.	Classical economics remains highly embedded within the institutions and methods of global governance. Behavioural economics has emerged to address the assumption on which classical economics is based; individuals and populations will behave rationally to maximise utility. Behavioural economics seeks to find patterns in behaviours that classical economics deem to be acting against self-interest or rationality. The deviations, if predicable, can be harnessed by policy makers by understanding the motivations of behaviours beyond solely economic self-interest. Theories such as 'risk aversion', 'loss aversion', 'confirmation bias' and 'bounded rationality' draw on social sciences to explain deviations from classical economic models. The use of behavioural economics, however, remains highly dependent on modelling with little use of empirical data. Moreover, economic insights typically emerge from theoretical or simulation modelling based on a number of simplifying assumptions rather than empirical data (Barnes et al. 2015).	These theories hold potential in biosecurity to better understand and plan community engagement, but the application in biosecurity so far remains limited. For enthusiastic students who want to find out what behavioural economics offers on engagement in biosecurity.
(Topic I) Nudge theory	Marteau et al (2011) give a good overview of what is nudge theory and what it offers in terms of understanding behaviour change Thaler and Sunstein (2008) discuss "choice architecture" in their book on how people can be influenced by small changes in the context of their choices (see the school cafeteria example). The paper by Mols et al (2015) on 'Why a nudge is not enough' critiques nudge theory and concludes that those promoting more lasting behaviour change need to engage	Nudge theory looks to explain and address behaviours that deviate from classical economics, which assumes individual maximisation of utility through 'rational choice' (Marteau et al. 2011). Nudge Theory is based on the concept of "choice architecture"; the environments that individuals and groups are situated within are never neutral nor fixed and have an influence on decision-making (Thaler and Sunstein 2008). The "choice architecture" or environments nudge, or create biases to, certain decisions that may go against the best interests of the individual or community (Thaler and Sunstein 2008). People often do not have the motivation, resources or time to consciously configure rational and logical thought on decisions (Marchiori et al. 2017). Simply put, nudges can be both positive and negative, and have an influence on choice-outcomes whether we are conscious of it or not. The conceptualisation of a nudge in the context of governance is a soft intervention in which freedom of choice remains, and are unobstructed, yet promotes more beneficial outcomes.The premise that differentiates nudges from 'traditional' or other governance tools is it excludes the use of regulation, legislation and interventions (Marteau et al. 2011). Nudges should not entail compulsion nor be obstructive (Bonell 2011). The categorisation of different nudges are	The theories that underpin nudges are not new. Nudge theory combines social psychology and behavioural economics without falling into a defined discipline. There are a number of critiques that highlight limitations of nudge approaches, e.g. Mols et al (2015), in the context of biosecurity community engagement.

Existing topic	Resources	What it is about	Remarks
	with people not as 'individual cognitive misers', but as members of groups whose norms they internalise and enact.	varied, and groupings are configured in numerous structures (see for a review of categories (Marchiori et al. 2017). A commonly accepted categorization has been Kahneman's dual theories work of '*Thinking Fast and Slow*'; A nudge is a "system one" if it targets passive or unconscious decision-making which is intuitive and or automatic; "system two" nudges focuses on rules-based approval and evaluation that is deliberate and thoughtful (Marchiori et al. 2017). Drawing from the paper by Mol et al (2015), there are the following nudges and their psychological underpinnings; • Nudges that aim to utilise the tendency to make decisions based on the option with the least resistance either intellectual or physical expenditure. • Nudges that leverage individuals' inclination to align with the dominant community norms and values or peer pressure. • Nudges that aim to use community members' desire and willingness to identify with community groups or groups that are valued and which can provide self-esteem; this could be linked to social or cultural capital.	
(Topic J) Social Marketing	The book by Serrat (2017) on '*The future of social marketing*', explains what social marketing is and its origins. The term was first used in the formative paper "*Social marketing: an approach to planned social change*" by Kotler and Zaltman (1971). Community-Based Social Marketing is a practical, structured approach developed by McKenzie-Mohr D (2011), edn, *Fostering Sustainable*	Social marketing can be broadly understood as an approach that incorporates aspects of sociology, psychology political science, anthropology and theories of communication (Serrat 2017). Social marketing draws upon traditional marketing techniques applying segregation research to recognise subgroups and target as to develop understandings of their willingness to alter behaviours to achieve a socially beneficial outcome. Although definitions remain varied, one of the more commonly used is from Kolter et al. who coined the term in 1971: *"the use of marketing principles and techniques to influence a target audience to voluntarily accept, reject, modify, or abandon a behaviour for the benefit of individuals, groups or society as a whole" (Lee et al. 2002).*	Links to Behaviour Prioritisation Matrix approach discussed in **Tool D** Behaviour prioritisation, and elements of *Community-Based Social Marketing* approach are applied in **Case study 2** Wild dog management, and **Case study 3** Biofouling.

Existing topic	Resources	What it is about	Remarks
	Behavior: An Introduction to Community-Based Social Marketing, British Columbia, Canada: New Society Publishers, to help environmental managers apply behaviour change theory to situations in which they are most likely to generate social change.	The use of social marketing in research and policy has increased rapidly since 2010. Social marketing offers a framework which is flexible and adaptable allowing to be used on a range of issues to drive behaviour change. The use of social marketing to address environmental issues is growing yet remains marginal in comparison to its use in the medical and health fields. Behaviour change, as argued by McKenzie-Mohr et al., is the basis of sustainability, yet historically there has been an effective reliance on large-scale campaigns based on information or education to motivate change (McKenzie-Mohr et al. 2011). Community based social marketing (CBSM) can be understood as a response to this understanding; programs and interventions that rely heavily or exclusively on media advertising mediums. These can be important in educating and raising awareness. However, they are likely to have a limited influence on creating behaviour change (McKenzie-Mohr 2011, p.x). The ineffectiveness of these approaches has as McKenzie-Mohr explains led many environmental managers to turn to social science's behavioural change tools; although the use is promising they are rarely applied in the right contexts or optimise their potential (McKenzie-Mohr and Schultz 2014). The paper by McKenzie-Mohr & Schultz (McKenzie-Mohr and Schultz 2014) outlines in a practical manner, the concepts and use of commitments, social diffusion, goal setting, social norms, prompts, incentives, feedbacks and convenience (McKenzie-Mohr and Schultz 2014). The targeting of social marketing in central to it success. Haq et al (2013) convey the two main areas, an existing routine or a point of life change and transitions to which behavioural change can be incorporated into, supporting increased acceptance. The cycle of feedback on behavioral changes needs to measurable to allow for a feeling of collective change among the targeted group (Haq et al. 2013).	

Appendix 2: Community engagement tools/methods list

Name	What it involves	Anticipated outcome	'Classification'	References
(Tool A) Rapid Appraisal of Agricultural Innovation Systems (RAAIS)	Diagnostic tool that can guide the analysis of complex agricultural problems and innovation capacity of the agricultural system in which the agricultural problem is embedded. RAAIS focuses on the integrated analysis of different dimensions of problems (e.g. biophysical, technological, socio-cultural, economic, institutional and political), interactions across different levels (e.g. national, regional, local), and the constraints and interests of different stakeholder groups (farmers, government, researchers, etc.). Innovation capacity in the agricultural system is studied by analysing (1) constraints within the institutional, sectoral and technological subsystems of the agricultural system, and (2) the existence and performance of the agricultural innovation support system	To assist with identifying best ways forward ('entry points for innovation'). More a diagnostic tool to provide a further level of analysis of Agricultural Innovation Systems (AIS), than a community engagement method or tool per se. But could be considered an engagement tool when it comes to implementing innovation through an Innovation Platform (which is similar to a 'Community of Practice').	Participatory approach Systems thinking	Schut, M., Klerkx, L., Rodenburg, J., Kayeke, J., Raboanarielina, C., Hinnou, L. C., Adegbola, P. Y., van Ast, A. and Bastiaans, L. (2015a) RAAIS: rapid Appraisal of Agricultural Innovation Systems (Part I). A diagnostic tool for integrated analysis of complex problems and innovation capacity. Agricultural Systems 132 (2015): 1–11. Schut, M., Rodenburg, J., Klerkx, L., Kayeke, J., van Ast, A. and Bastiaans, L. (2015b). RAAIS: rapid appraisal of agricultural innovation systems (Part II). Integrated analysis of parasitic weed problems in rice in Tanzania. Agricultural Systems 132 (2015):12–24.
(Tool B) Program Logic Workshop	A program logic is a schematic that describes how a program (or project) is intended to work. It shows the intended causal links in a program by linking activities with outputs, intermediate impacts and longer-term outcomes. Program logic is ideally used at the project planning stage to allow stakeholders to articulate the desired program impacts and outcomes and how these will be achieved.	Students can develop skills in how to plan successful community engagement projects or programs. Specific skills and understandings include: – Meaning and purpose of program logic – When and how to develop program logic – How program logic can be used, with a particular focus on planning an evaluation (NSW Ministry of Health, *Developing and using program logic: A guide* (Campbell et al. 2017a)	Planning an approach to community engagement projects Evaluating engagement projects	Australian Government, (2009a) Developing and using Program Logic in natural resource management: User guide is an accessible and practical guide for building a program logic, as adapted and applied in the Goodfruit case study 1. NSW Ministry of Health also published an updated guide to Developing and using program logic (Campbell et al. 2017a), which is a very accessible.

Name	What it involves	Anticipated outcome	'Classification'	References
(Tool C) The MERI Framework	The MERI process includes: – program logic – monitoring – evaluation and reporting – improvement and adaptive management	Students can develop skills in applying MERI processes to their community engagement activities.	Monitoring & evaluating community engagement projects Program logic	MERI framework 'how to' guide for evaluating community engagement in biosecurity projects in Kruger (2012) *Biosecurity Engagement Guidelines: How to Develop an Engagement Strategy Including a Monitoring and Evaluation Component*: ABARES. Australian Government (2009b) NRM MERI Framework, Australian Government Natural Resource Management Monitoring, Evaluation, Reporting and Improvement Framework.
(Tool D) Behaviour prioritisation	Involves techniques for understanding your stakeholders key drivers and barriers for change, in a structured way.	Learning strategies for determining which behavioural changes are likely to have the most impact, and focussing on encouraging those behaviours in the engagement plan.	Behavioural change Selecting communication and engagement strategies	An application of Community-Based Social Marketing, including Behavioural Prioritisation in the context of collective wild dog management, is in Hine D, McLeod L & Driver A (2019), Designing behaviour change interventions for invasive animal control: A practical guide, An Invasive Animals CRC Project, University of New England, Armidale. The
(Tool E) Message framing	If you understand the knowledge and belief systems that relate to a biosecurity issue, this can be useful in making your messages clear and persuasive. Hine et al (2015) talk about the importance of 'knowing your audience' and selecting the right message frame that matches the audience's values and concerns. They suggest that some of the most effective frames that can gain an audience's attention are to highlight the consequences of not taking action, and emphasising local and immediate consequences.	Could be a useful practical tool linked to the above topic – to illustrate how you could use the knowledge systems/institutional logics in interactions with stakeholders Possibly incorporate as part of **Weeks 2 & 3** stakeholder analysis	Communicating effectively Behavioural change	**Chapter 5: Framing messages for maximum impact** in Hine DW, Please P, McLeod L & Driver A (2015), ***Behaviourally Effective Communications for Invasive Animals Management: A Practical Guide***, Invasive Animals Cooperative Research Centre, Canberra, Australia.

Name	What it involves	Anticipated outcome	'Classification'	References
(Tool F) Social network analysis	The structure of social networks in natural resource management or biosecurity can influence the forms of participation and collaboration that different stakeholders have. These relationships (or networks) can be examined and the links between the network's characteristics and their function can be explored.	Could introduce the idea of structural characteristics of stakeholder and social networks and how this may have implications for the way this enables or inhibits actors to participate. However, much of this literature is about the techniques of analysis used for measuring and quantifying these network relationships, which is likely to be beyond the scope of the master's course, but useful to know that these techniques exist.	Understanding an quantifying stakeholder relationships Could be an extension of the 'stakeholder analysis' topics in **Weeks 2 & 3** about understanding your stakeholders	Bodin et al.'s (2006) article about 'Social networks in natural resource management: What is there to learn from a structural perspective?' is an accessible introduction to network analysis considerations. An ABARES study that applies social network analysis techniques to understand the marine pest stakeholder network in Australia will be available later in 2019. Stenekes et al (2019) *'Who talks to whom about marine pest biosecurity? An analysis of the Australian marine pest network'* will be available on the ABARES website at this URL: http://www.agriculture.gov.au/abares/research-topics/social-sciences/biosecurity when it is published.

Appendix 3: Case study materials

Case study 1: Goodfruit horticultural region—engaging community volunteers in fruit fly trap monitoring

Introduction

Queensland fruit fly (QFF) is native to eastern Queensland and north eastern New South Wales and has spread to urban and horticultural areas in Queensland, New South Wales, Victoria and the Northern Territory. The Goodfruit[2] region in tropical Queensland is one of the most important horticultural regions of Australia. Queensland fruit fly (*Bactrocera tryoni*) is an endemic pest in the fruit and vegetable growing region, and represents a significant threat to production horticulture. There are other pests including Heliocoverpa moths (formerly Heliothis moths) (*Heliocoverpa armigera; Heliocoverpa punctigera*), which can also affect a range of commercial vegetable crops (e.g. tomatoes, capsicums, zucchinis, melons) grown in the region.

Queensland fruit fly: Images courtesy of PaDIL http://www.padil.gov.au/pests-and-diseases/pest/main/136196

The Goodfruit Growers Cooperative decided to establish a volunteer network to support the roll out of grid-based automated pest traps in the area. They recognised that volunteers from the community can play an important role in assisting with the spatial detection of horticultural pests and diseases in the area. The role of volunteers was to clean and calibrate the automated pest traps on a regular basis and participate in quality assurance/training activities. A co-ordinator was engaged to recruit and set up the volunteer network.

These activities occurred in parallel with a technical research and development that investigated the detection efficiency and spatial distribution of the automated pest trap network. This was part of a regional level implementation of Integrated Pest Management (IPM) in production horticulture, which aimed to provide a unified approach to pest and disease control on an area-wide basis.

[2] This was a real project however; names of people, places and organisations have been changed to maintain anonymity of those involved.

Project aims

The aims of the community pest monitoring project were to:

- raise awareness of the potential role of urban communities in horticultural pest and disease detection
- connect urban based groups with horticulture growers in the area
- build community ownership of pest problems in the long term
- facilitate spatial detection and reporting of pest presence and directional movement to growers
- develop a volunteer network for monitoring priority pest traps
- understand the motivators, enablers and barriers to engaging volunteers in routine trap monitoring for fruit fly.

Activity

Possible discussion questions

Exploring outcomes of the Goodfruit case study:

1. What benefits did individuals experience from being in the community pest monitoring network?
2. What were the personal issues or constraints experienced? What could be done to help?
3. a) What were the benefits for the community as a whole?

   b) What are the issues with involving communities?
4. What motivated the urban community groups to participate in the pest monitoring network?
5. What could be done to maintain and increase enthusiasm and to attract new people into the network?
6. What were the key elements of success of the community pest monitoring network?
7. What are some potential directions for expansion of the network in the future?

To develop understanding of the MERI framework. These questions could be used as a guide for preparing for pre-assignment **Assessment 3** (presentation):

8. What different purposes are there for evaluating a community engagement project or program?
9. Who are the partners in the Australian Government Natural Resource Management (NRM) partnership model?
10. What are the key steps to developing a MERI plan?
11. What five key principles underlie the MERI framework?

12. Is there any difference between monitoring and evaluating?
13. Why use a program logic?
14. The program logic component is based on a 'theory of change'. How does it help to identify what to evaluate?
15. Why would you use a participatory approach to develop a program logic?
16. Would you say that MERI has an ethical dimension?

Possible assessment tasks

This could be either an additional case study, or possibly, an alternative scenario for **Assessment 3** (presentation on proposed community engagement (CE) plan) and **Assessment 4** (written CE plan).

A. Develop a project plan using community engagement activities that meets the project aims. You should consider:

1. What community engagement activities, methods or tools would you use to establish a volunteer biosecurity network?
2. Why do you think they would work? What would each activity achieve?
3. Would these be the same activities you would use to maintain the network in the long term?
4. What are some risks or challenges that should be considered?

B. Think through a plan for monitoring and evaluating the Goodfruit community monitoring project. Consider the following:

5. How would you build a monitoring and evaluation component into the Goodfruit volunteer network project?
6. How would you know whether the project aims had been achieved?
7. Who are your audiences for the evaluation?
8. What information would you collect that would inform those audiences about what has been learned from the volunteer network relative to the stated aims of the project?

Resources

Information about the pests

NSWDPI, Queensland fruit fly - Fact sheet

Queensland Government, Helicoverpa (formerly called Heliothis moth)

Queensland Department of Agriculture and Fisheries, Helicoverpa management article in the electronic resource The Beatsheet: Insect pest management for Australia's northern region.

Review of the community engagement part of the project

The anonymised report by Stenekes & Please {, 2012 #119} reviews the outcomes of the volunteer monitoring pilot project. Key points from this review are also distilled in Kruger et al (2012) *Biosecurity engagement: Involving volunteers in biosecurity engagements programs.*

Monitoring and evaluating the project

MERI framework 'how to' guide for evaluating community engagement in biosecurity projects is available in Kruger (2012) Biosecurity engagement guidelines: Principles and practical advice for engaging communities.

The original Australian Government MERI framework is explained in NRM MERI Framework: Australian Government Natural Resource Management monitoring, evaluation, reporting and improvement framework (2009b). This introduces the key MERI concepts and gives details about what monitoring, evaluation and reporting is.

Australian Government, (2009a) Developing and using Program Logic in natural resource management: User guide is a very accessible practical guide for building a program logic, as applied in the case study.

Case study 2: Prioritising community behaviours to improve wild dog management

Introduction

Wild dogs can have major impacts in peri-urban areas as well as rural environments. Peri-urban areas are characterised by urbanising processes through the conversion of former rural lands to more built-up uses. Impacts in these regions are diverse, as Please et al (2018) describe, and can include attacks on livestock, disease spread, attacks on humans, impacts on native animals and psychological impacts related to elevated stress and fear within communities.

Communities have a critical role to play in managing wild dogs and other biosecurity risks in urban areas. Please et al. (2018) note that residents in Queensland, have a general biosecurity obligation, which means they are responsible for managing biosecurity risks that are under their control or that they could reasonably be expected to know about. Community participation is a key factor in managing wild dogs and other biosecurity risks in peri-urban areas.

Communities might not be prepared to do what experts recommend as the best way to address a particular pest, weed or disease issue. In order to make progress there is need to align what the community is prepared to do with scientific recommendations.

Community-Based Social Marketing (CBSM)

Community-Based Social Marketing is a behaviour change framework adopted in environmental management and sustainability sectors (McKenzie-Mohr 2011) that involves a 5-step approach for designing successful interventions to promote pro-environmental behaviours. Essentially, the approach applies human behavioural theories to work out what strategies are likely to be most effective when seeking to change community behaviour.

The study by Please et al (2018) used a key tool in the Community-Based Social Marketing (CBSM) approach, called the Behaviour Prioritization Matrix (BPM) to identify and select behaviours that landholders can undertake which can be the focus of any extension or intervention program. This focus on behaviours of landholders is slightly different from traditional education interventions in rural studies which they say emphasises attitudes as the main determinants of behaviour. Positive attitudes may not translate into adoption of animal control behaviours if, for example, there are other barriers present.

Project aims

The aim of the study reported in Please et al. (2018) was to develop and implement targeted communication and education tools that encourage landholders to participate in appropriate wild dog control behaviours in peri-urban areas of the City of Gold Coast in South East Queensland.

Activity

The CBSM behaviour prioritisation matrix is a tool that helps choose the communication and education interventions that are most likely to work. This could be **used as an approach for choosing the right engagement tools that is the topic in *Week 10 Engagement tools.***

Currently Week 10 focuses on Aslin and Brown (2004) and when to use different engagement tools (p.27). It encourages students to reflect on the reasons why you would choose a particular tool based on the purpose of engagement, nature of people you want to engage, the constraints, history of issues in the community and who has the decision-making power (p.26).

The wild dog management CBSM case study could be included to provide additional structure for developing skills in selecting the tools that are appropriate for community engagement.

Some possible discussion questions

Having read the paper by Please et al (2018)on community participation in wild dog management, consider the following questions:

- describe the 'community' that was the target population in the wild dog study. How does the wild dog problem of the peri-urban resident community compare with that of the rural community discussed in the paper by Please et al (2018)
- who were 'the experts' and why is it important to involve experts in identifying effective behaviours for wild dog control?
- Have a look at the 13 priority behaviours that experts in wild dog management identified as most effective for the community.

  The most effective behaviour as perceived by experts was to permit landholders to administer lethal poison to wild dogs on their properties using ejectors with cyanide or 1080. How did the community view these actions in terms of current level of adoption of this practice and their willingness to do this in future?
- what actions were members of the community already using? Which actions are they more likely to undertake in the future and why? What does this tell you about the capacity and willingness of landholders to participate in wild dog management actions?
- how does the behaviour prioritisation matrix help identify the community behaviours that are most likely to improve wild dog management?
- what engagement strategies and style of communication would you adopt to engage this community in wild dog management given the outcomes of this study?

Resources

Information about community engagement in wild dog management

The Paroo model of wild dog management in the paper below discusses community engagement at the landscape level – called the 'nil tenure pest control planning' approach - in the Paroo Shire area of Queensland. Well worth a read about one of the best models of community engagement seen in invasive species management.

Paroo Shire Council 2011, *The Paroo model of wild dog control*, An initiative of South West Regional Economic Development Association Inc., Queensland.

Behavioural framework information

McKenzie-Mohr D 2011, *Fostering Sustainable Behavior: An Introduction to Community-Based Social Marketing,* British Columbia, Canada: New Society Publishers. Available from: http://www.cbsm.com/pages/guide/preface/

McKenzie-Mohr D & Wesley Schultz P (2012), Choosing Effective Behavior Change Tools, In: Paper presented at the Behavior, Energy and Climate Change Conference, Sacramento, California.

– This is a shorter, more accessible conference paper than the book above, which summarises the 'nudges' used in the CBSM approach.

Michie S, van Stralen MM & West R (2011), 'The behaviour change wheel: A new method for characterising and designing behaviour change interventions', *Implementation Science*, vol. 6, no. 42.

Applications of behavioural frameworks to invasive animals management

McLeod J., Hine D., Please P., Driver A. (2015b) Applying behavioural theories to invasive animal management: Towards an integrated framework, Journal of Environmental Management

Patricia M. Please, Donald W. Hine, Petra Skoien, Keri L. Phillips & Iain Jamieson (2018) Prioritizing community behaviors to improve wild dog management in peri-urban areas, Human Dimensions of Wildlife, 23:1, 39-53.

McLeod L, Hine D & Bengsen A (2015a), Born to roam? Surveying cat owners in Tasmania, Australia, to identify the drivers and barriers to cat containment, The Netherlands, Elsevier BV.

Other resources on participatory wild dog management

Ecker S, Aslin H, Zobel-Zubrzycka H & Binks B (2015), *Participatory wild dog management: Views and practices of Australian wild dog management groups*, ABARES, Report to client prepared for Australian Wool Innovation. This report has useful insights into the internal workings of wild dog management groups that operate throughout Australia and how they engage, coordinate and maintain the involvement of a wide range of people in their communities in wild dog management.

Binks B, Kancans R & Stenekes N (2015), *Wild dog management 2010 to 2014: National landholder survey results*, ABARES, Report to client prepared for Australian Wool Innovation. This report summarises the results of national surveys about the functioning and issues faced by participatory wild dog management groups in Australia. 120 such groups were identified by the survey.

Thompson L-J, Aslin H, Ecker S, Please P & Trestrail C (2013), *Social impacts of wild dogs—a review of literature*, ABARES report prepared for AWI Ltd, Canberra. This review reveals issues emerging in the wider literature about the social impacts wild dogs can have on communities and livestock enterprises.

Case study 3: Recreational boat operator's self-management of biofouling in Australia

Introduction

Biofouling is a term used to describe the aquatic organisms—including microorganisms, plants and animals—that attach and grow on surfaces submerged in or exposed to the marine environment. This can include the hull and niche areas of boats, for example, sea chests, rudders, propeller shafts, internal piping and anchor boxes.

Vessels that have biofouling can unintentionally transport invasive plant and animal pest species within the Australian marine environment. Biofouling accumulation rates on vessels differs depending on operational profiles, maintenance activities and voyage patterns.

A 2015 Review of National Marine Pest Biosecurity in Australia highlighted domestic recreational vessels as a biosecurity management gap and recommended the Australian Government initiate education and awareness raising about biofouling management in line with the International Maritime Organization (IMO) biofouling guidelines for recreational vessels.

Australia's national approach to domestic marine pest biosecurity relies heavily on voluntary uptake of the national biofouling management guidelines by recreational vessel operators to prevent and manage biofouling growth. However, little was known about the uptake of the voluntary guidelines by the recreational vessel sector. Detailed information on the awareness levels about biofouling and marine pests, biofouling management practices (or behaviours), and domestic voyage patterns of domestic recreational boat operators in Australia is lacking, particularly across Australia's state jurisdictional and national scales.

Project aims

To assist with this, the Department of Agriculture and Water Resources commissioned ABARES to conduct a nationwide research project to establish an understanding of domestic recreational vessel operator's marine pest awareness, the current standard of biofouling management activities, vessel movement patterns in the domestic recreational vessel sector, and the potential contribution of the sector to managing biofouling risk.

The approach taken in the project was to identify where the greatest impact in promoting voluntary options for biofouling management lies, including what behaviours should be targeted for change, and for whom the educational campaigns can be focussed within the recreational vessel sector. The development of actual educational materials was not in scope for the project. However, the information from the project could be used to inform the development of educational materials to encourage uptake of the voluntary guidelines and help guide investment in voluntary measures for the domestic recreational sector in order to minimise biofouling risks.

The objectives of the research project were therefore to provide a better understanding of:

- the level of marine pest awareness of domestic recreational boat operators in Australia
- hull husbandry practices adopted by domestic recreational boat operators to manage biofouling accumulation on their boats

- barriers and benefits to improved self-management of biofouling by domestic recreational boat operators
- trusted communication channels used by domestic recreational boat operators
- domestic recreational boat voyage patterns in Australia.

To address these objectives a quantitative survey was chosen as a primary data collection strategy to gather evidence directly from domestic recreational boat operators. Other methods used in the project to gather evidence included a stakeholder analysis, expert elicitation process to identify the best marine pest and biofouling management practices, global review of existing surveys and literature on recreational boat operator's practices, and interviews with marina and slipway industry operator representatives, and boating industry representatives.

Activity

Familiarise yourself with the ABARES technical report by Stenekes, Kancans & Binks (2018) (see resources below) and consider the following questions.

Possible discussion questions

- What key enablers or barriers to better biofouling management did the research find for the recreational boating sector?
- What would you do with this information about the barriers and benefits of the biofouling management actions?
- Would you describe this project as community engagement? Why/why not?
- What makes recreational boaters a 'hard to reach' population and therefore, difficult to find and engage on an issue?
- Why would you use a behavioural framework to understand the recreational boating sector?
- In particular, why would a *Community-Based Social Marketing* approach be useful for understanding the practices and potential for change in this boating sector (or not)? Are there other frameworks that could be used?

Possible assessment tasks

As an alternative scenario to use for *Assessment 1: Stakeholders analysis* and engagement

- Which stakeholder groups are likely to be concerned with recreational boat biofouling or marine pests?
- What role do they have in the problem or solution, what interest or influence are they likely to have in relation to recreational boat biofouling or marine pests?
- Who are the trusted communication channels and sources most likely to be in a position to influence recreational boat operators?

- How would you engage recreational boaters in light of the study findings?

Resources

Information about biofouling and marine pest risks of yachts

Floerl O & Inglis GJ (2005), Potential for the introduction and spread of marine pests by private yachts, In: *Hull fouling as a mechanism for marine invasive species introductions. Proceedings of a Workshop on Current Issues and Potential Management Strategies*, Honolulu, Hawaii.

Key policy documents

Australian Government, (2015) Review of National Marine Pest Biosecurity, Department of Agriculture and Water Resources, Canberra.

ABARES review report

Stenekes N, Kancans R & Binks B (2018) Recreational boat operator's self-management of biofouling in Australia, ABARES Technical report 18.4, Canberra.

Community-Based Social Marketing (CBSM) behavioural framework

McKenzie-Mohr D (2011), *Fostering Sustainable Behavior: An Introduction to Community-Based Social Marketing,* British Columbia, Canada: New Society Publishers. Available from: http://www.cbsm.com/pages/guide/preface/

McKenzie-Mohr D & Wesley Schultz P (2012), Choosing Effective Behavior Change Tools, In: Paper presented at the Behavior, Energy and Climate Change Conference, Sacramento, California. – This is a short, quite accessible conference paper, which summarises the 'nudges' used in the CBSM approach.

Michie S, van Stralen MM & West R (2011), 'The behaviour change wheel: A new method for characterising and designing behaviour change interventions', *Implementation Science*, vol. 6, no. 42.

Other applications of the CBSM behavioural framework to biosecurity

Please PM, Hine DW, Skoien P, Phillips KL and Jamieson I, (2018) 'Prioritizing community behaviors to improve wild dog management in peri-urban areas', Human Dimensions of Wildlife, vol. 23, no. 1, pp. 39-53

McLeod L, Hine D & Bengsen A (2015a), *Born to roam? Surveying cat owners in Tasmania, Australia, to identify the drivers and barriers to cat containment,* The Netherlands, Elsevier BV.

Case study 4: Tully Black Sigatoka Outbreak in the Queensland Banana Industry

Introduction

Mycospheaerella fijiensis, commonly referred to as black sigatoka, is a leaf disease caused by a fungus endemic to Papua New Guinea and the Torres Strait islands (Petersen et al. 2005). While there had been previous incursions of the disease on the Cape York Peninsula, the black sigatoka incursion in Tully in 2001 was the first in a major commercial banana growing region in Australia. The area was officially declared disease free in March 2005, which was the first time the disease had ever been successfully eradicated from a large growing area (Henderson et al. 2006).

The Tully Banana Production Area (TBPA) encompasses 4,400 km^2 including 4,500 ha of banana plantations and extensive sugar cane crops (Petersen et al. 2005). The area includes the townships of Tully and Mission Beach, several national parks, and adjoins the World Heritage listed Great Barrier Reef Marine Park.

The main goal of the black sigatoka eradication program was to eradicate the disease and be able to have the area declared disease free, in order to ensure Australia's access to international markets. The program was run in three parts:

- the delimiting surveys, which determined the extent of the infestation
- the eradication program
- and the verification program (Petersen et al. 2005).

The incursion was initially managed in accordance with a strategy that had been developed based on the earlier incursions in Cape York. However, following the spread of the outbreak, the 'doze and burn' program was abandoned, and a new management program was developed. Key features of the new strategy included an intensive, mandatory spray program for all growers in the TBPA and a de-leafing and monitoring program.

Community engagement

Numerous tools and mechanisms were used to effectively engage the community and extend resources during the Black Sigatoka eradication program in Tully, Queensland, which began with the incursion of the leaf disease in 2001. It was a world first for Black Sigatoka to be eradicated from a commercial banana plantation.

Effective engagement was a key contributing factor to the success of the eradication program. The *Biosecurity Engagement Guidelines: Principles and practical advice for engaging communities* by Kruger et al. (2012) outlines the main engagement tools that were used in as part of the eradication program in Tully, as follows:

Face-to-face contact by eradication program representatives

Program representatives, which included industry and government employees, had regular face-to-face contact with growers and community members throughout the outbreak, but particularly over the first few months.

Shed meetings

Shed meetings were used to regularly meet with growers (every 1-2 weeks) to provide updates on what was happening with the eradication program. Industry staff and DPI staff were available to answer technical questions and the meetings were chaired by 'shed captains', young growers selected to lead the groups. Efforts were made to make the sheds as comfortable as possible and catering was provided. Shed captains also met fortnightly to discuss the program in more detail and to plan the next steps for eradication in conjunction with DPI and industry staff. As the program progressed the meetings became less frequent and other engagement tools and mechanisms were used to keep the growers up-to-date.

Monitors

Monitors were employed to regularly inspect all farms in the Tully district. Mandatory regular monitoring for detection of Black Sigatoka and leaf spot levels was enforced during the first stages of the eradication program, which provided abundant opportunities for face-to-face interaction. Where monitors encountered difficulties dealing with specific landholders, they were instructed to refer the matter to DPI technical staff who then visited the grower. By all accounts the monitors were very professional and developed good relationships with the growers they visited.

Volunteers

Volunteers were engaged to doorknock backyard banana growers in some areas. Notably, the growers close to Mission Beach played a key role in getting backyard growers on board.

Phone calls

Phone calls were made extensively to engage growers and other community members in the eradication program. The program coordinators and liaison staff usually met key growers face-to-face in the first instance, but used phone calls to follow up. Calls were also made to growers to encourage them to attend shed meetings; this helped bring 90 per cent of growers to shed meetings.

Printed material

Personal contact was the preferred mechanism for the engagement strategy; however, it became impossible for all stakeholders to be engaged this way. Having established good relationships with the growers and other community members, other tools were used to keep the community engaged throughout the eradication program.

Faxes

It was mandatory for growers involved in the eradication program to have fax machines. Faxed updates provided information on program progress and informed them of imminent meetings.

Newspaper and radio

Local media provided updates to growers and the wider community. Industry representatives provided regular updates on ABC radio and local stations. Having the message delivered by industry representatives worked effectively as they were not subject to the strict clearance protocols of government communications. It also meant the message came from people directly affected by the outbreak.

Summary

The success of the Tully Black Sigatoka eradication program relied on high levels of commitment from all growers and community members. The success of the engagement process relied on personal communication that upheld the key engagement principles, including trust, respect, credibility, genuineness, responsiveness and transparency. Much of the success of re-establishing area freedom can be attributed to a number of committed individuals who worked to make sure opportunities were available for personal interaction with all relevant stakeholders.

Social network analysis of the Black Sigatoka response in Tully

Communities are made up of a complex network of sub-groups formed by interactions of location, interests, and needs. Communities are not spatially defined instead are complex layers of social interaction which form group identities, norms, culture and behaviours. Communities can be defined in terms of:

- spatial proximity
- shared interests
- social networks

McAllister et al. (2015) considered the social networks that developed during the black sigatoga response in Tully and the way these networks contributed to the successful eradication. Social network analysis is a technique that looks at the 'institutional fit' – and key to this are the social networks – that are in place and how well they are set up to manage coordinated response efforts. In Tully, they stress that the response effort was driven at the local level by unique response networks that linked stakeholders at grower, industry and governmental scales which was critical to the success of the eradication program.

Possible discussion questions

- In what way were the community engagement strategies used in the black sigatoga response in Tully appropriate for that situation and why?
- Why would you use a social network analysis?
- What were the 'cross scale' network linkages that McAllister et al. (2015) talk about in their paper, and why were these so important in the Tully response?

- What are the challenges of collecting social data for a network analysis?

Resources

Information about black Sigatoga (Mycosphaerella fijiensis)

Peterson R, Grice K, Goebel R (2005) Eradication of black leaf streak disease from banana growing areas in Australia*, Infomusa, Vol 14 No 2 December 2005.*

Henderson et al. (2006) Black sigatoga disease eradication strategies, *Australiasian Plant Pathology,* Vol 35 Issue 2 pp 181-193. This article has more about the past disease detections in Australia and diagnostic techniques used for disease detection.

Media reports

ABC Landline, Shoebridge J., Tully set to recover from black sigatoga*, 13/7/2003 edn*

ABARES community engagement guidelines

These guidelines were developed by ABARES based on six case studies of community engagement as part of biosecurity programs in Australia, which the researchers evaluated. The wisdom from these experiences are distilled into the *Guidelines* at the link below. Box 2 'A Toolbox for Tully: The battle against Black Sigatoka was waged in the sheds' (page 35 of the *Guidelines*) presents a summary of the community engagement tools used in the black sigatoga response.

Kruger H, Stenekes N, Clarke R & Carr A (2012), Biosecurity engagement guidelines: Principles and practical advice for engaging communities, ABARES, Canberra.

Social network analysis and the Tully black sigatoga response

McAllister RRJ, Robinson CJ, MacLean K, Guerrero AM, Collins K, Taylor BM & De Barro PJ (2015) 'From local to central: A network analysis of who manages plant pest and disease outbreaks across scales', *Ecology and Society*, vol. 20, no. 1, pp. 67.

Case study 5: Evaluation of Asian honeybee community engagement activities

Introduction

The Asian honeybee (AHB) was first discovered in Cairns in May 2007. AHB poses a potentially serious threat to both native and European bees through competition for floral resources and as a natural host of the Varroa mite parasite, a harmful parasite that is known to cause deformities in European bees and bee pupae. Following the initial incursion in 2007, Biosecurity Queensland (a service unit of the Queensland Department of Employment, Economic Development and Innovation – DEEDI) instigated an eradication program that included both a targeted surveillance and eradication program, and community engagement component to increase public reporting of AHB sightings (Kruger et al. 2011).

Project aims

The community engagement program was aimed at increasing community awareness of the appearance and threat of AHB to encourage reporting of suspicious bees, swarms and nests via the Biosecurity Queensland pest hotline. The funding and staffing for the community engagement program for AHB varied over time, initially relying on operations staff to raise community awareness, with a dedicated community engagement officer first employed in 2009. Key elements of the community engagement program include the development of awareness materials including brochures, “while you were out” door hangers, bee identification blocks and identification cards. These materials are designed to complement engagement officers targeting community events and meetings to raise awareness about AHB. Other activities of the community engagement unit included liaising closely with members of industries likely to be exposed to AHB, such as transport businesses near the core infestation of AHBs and bee keepers (Kruger et al. 2011).

In 2010 Biosecurity Queensland partnered with the Australian Government, through the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), to evaluate the effectiveness of the community engagement component of the AHB eradication program and to assist ABARES in researching effective community engagement (Kruger et al. 2011).

The partnership set out to evaluate the impact of the AHB community engagement activities in increasing community awareness of AHB and reporting of suspicious bees, swarms, and nests in Far North Queensland, and to identify areas for improvement.

Activity

Possible discussion questions

Read through the ABARES report by Kruger et al. on AHB and discuss/think about the following questions. This could be incorporated into **Week 4: Community** where the focus is on guidelines and strategies for engaging the public.

- Why was a collaborative partnership between ABARES and BQ important for carrying out the evaluation of community engagement?
- What were the main ways that Biosecurity Queensland engaged the public to look out for AHB?

- What were the main motivations and barriers for members of the public to report suspect bees?
- What strategies were more successful in encouraging members of the public to report suspect bees and why?

Possible links to other topics

The AHB community engagement evaluation project was somewhat concerned with what is considered good—in terms of what is effective—community engagement (discussed in **Week 5: Ethical practice**). Aslin & Brown's (2004) handbook on community engagement could be used as the basis for a discussion about the values and principles underpinning the AHB community engagement program.

This case study could also be used as an example of how the MERI framework was applied to monitor and evaluate a community engagement program. For example the stakeholder planning workshop was held to develop a **program logic** and identify strategies for gathering evidence for the evaluation. Could be a basis for **discussing how the MERI framework was used** in the AHB evaluation project.

Resources

The ABARES report below discusses the aims, approach and findings of the evaluation of the AHB community engagement activities and is shared with permission from Biosecurity Queensland.

Kruger H, Clarke R, Green D & Soymonoff A (2011), An evaluation of the Asian honeybee (AHB) community engagement project, ABARES report prepared in partnership with Biosecurity Queensland (with permission), Australian Bureau of Agricultural and Resource Economics and Sciences.

Case study 6: Golden Kiwi fruit bacterial canker social and economic impacts

Introduction

The kiwifruit industry in New Zealand is a major export commodity generating $1.9 billion in 2016 from the 12,185 hectares of kiwifruit orchards. Zespri, the export company that represents New Zealand growers, is the world's largest marketer exporting to 53 countries and overseeing 30 per cent of global trade (NZKGI 2016).

Kiwifruit vine infected with Psa. Photo: Plant & Food Research NZ

The bacteria *Pseudomonas syringae pv. actinidiae* (Psa) was first detected in New Zealand in 2010. The origin of the biosecurity breach remains unknown. South Korea and Italy have both had Psa outbreaks. However, they did not experience the rapid spread of the bacteria that occurred in New Zealand. Psa-V the strain found in NZ, affects kiwifruit vines causing a number of symptoms such as leaf spotting, tissue wilting and in severe cases result in vine death. PSA does not affect animals or humans, and its spread is limited to kiwifruit vines (Primary Production Committee NZ 2015). PSA is thought to be spread by water, wind and contaminated farming equipment including protective clothing (ibid.). The symptoms of the disease are not specific or homogeneous making identification slow and difficult.

The outbreak of Psa for the NZ kiwifruit industry was its first serious disease or insect it had to deal with (Birnie and Livesey 2014). The economic impact of the outbreak in NZ was been estimated to be between NZ$310-410 million (Greer and Saunders 2012). The outbreak was so severe that Psa was and remains the most substantial biosecurity threat to kiwifruit.

Biosecurity response

The initial response was led by the Ministry of Primary Industries (MPI) NZ and Zespri through an industry and government partnership. The funding of the response was shared between the government and the kiwifruit industry, which each contributed $25 million. The funding supported the establishment of Kiwifruit Vine Health (KVH) Inc. that lead and coordinated the response. Initially, the treatment used was to cut out the infected vines. However, this approach and compensation related to it, stopped in early 2011. Instead, subsidised copper spray and a new stock of gold kiwifruit G3 vines with a higher resilience were grafted into existing orchards. This approach is seen as the turning point in the outbreak along with a management plan development plan by KVH that continues today.

Social impacts are rarely considered in biosecurity responses. However, the impacts of outbreaks can overwhelm individuals and communities. The outbreak of mad cow disease in the UK for example saw suicide rates rise exponentially. The potential social impacts of the Psa outbreak were significant considering that in 2012, it was estimated the outbreak could result in the loss of between 360 and

470 full-time-equivalent jobs in the following 5 years (Greer and Saunders 2012). Remarkably there were no recorded suicides linked to the outbreak, which was not by chance, as some of the key aims of the response were to maintain social wellbeing and minimise the risk of suicides among communities impacted by the outbreak (Vanneste 2017). The communication strategy and rapid release of findings was aimed to reducing anxiety and stress surrounding communities. Industry supported local initiatives to maintain the wellbeing of those who were affected by the response to Psa. The industry worked with different levels of government to provide tax and land rates subsidies to reduce financial stress on those who were affected. The industry also quickly engaged the financial sector to ensure investment would not increase the harm of the outbreak.

Possible discussion questions

- Who are the stakeholders in the biosecurity issue? Who was involved and who was not?
- Why are the considerations of social aspects of biosecurity response important? Consider this in the context of the response but also future responses.
- How did the governance of the response influence outcomes?
- Were there tensions in the initial engagement by government and industry before Kiwifruit Vine Health Inc. (KVH) was set up? What changed in engagement methods post KVH establishment?
- At what levels and in what sectors did engagement occur? Which stakeholders were included and who held decision-making power?

Resources

There is a vast array of sources for students to find and engage with from newspaper articles, government reports, industry reports and journal articles.

Information about Psa-V strain

The Kiwi Vine Health Inc. website has a lot of reports on the issue and independent review on how the incursion was handled.

Kiwifruit Vine Health Inc. About Psa https://www.kvh.org.nz/

Media reports

NewsHub 2017, *Devastation of PSA still felt by kiwifruit growers* [Accessed 16/04/2019].

RNZ 2018, *Kiwifruit growers on MAF PSA finding: 'You went from hero to zero'* [Accessed 16/04/2019].

Literature

Vanneste, J.L., (2017) The scientific, economic, and social impacts of the New Zealand outbreak of bacterial canker of kiwifruit (Pseudomonas syringae pv. actinidiae), Annual review of phytopathology, 55, pp.377-399.

Birnie, D. and Livesey, A. (2014). Lessons learned from the response to Psa-V. Retrieved from New Zealand

Greer, G. and Saunders, C.M., (2012) The costs of Psa-V to the New Zealand kiwifruit industry and the wider community, Agribusiness and Economics Research Unit report to Kiwifruit Vine Health NZ, New Zealand.

New Zealand Kiwifruit growers Inc., Industry in NZ, [accessed 16/04/2019].