



Australia's National
Science Agency

Resilience Adaptation Pathways and Transformation Approach

A guide to designing, implementing
and assessing interventions for sustainable futures

Version 2





Authorship

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Cover photography: Yonas Yimer

The world is changing at an unprecedented rate, in unfamiliar and unpredictable ways.

A common response across sectors is to call for resilience, adaptation or transformation of systems from local to global scales. There is growing investment in activities aimed at building resilience, or enabling adaptation and transformative change, often with differing interpretations of these concepts and how projects, programs, policies or investment initiatives (collectively termed 'interventions') can deliver them. Off-the-shelf decision-making and planning processes such as strategic planning, risk assessment and stakeholder engagement processes were not designed to cope with this level of change and uncertainty, and new approaches are required to be effective and robust in these circumstances.

The Resilience, Adaptation Pathways and Transformation Approach (RAPTA) has been developed to design, implement and evaluate interventions for achieving sustainability goals within highly uncertain and rapidly changing decision contexts.

The approach is readily tailored to meet different intervention needs, building on and challenging familiar design, implementation and evaluation processes from a systems perspective to put concepts of resilience, adaptation pathways and transformation to work. Outputs such as models or plans are valuable, however the processes of participating, appreciating new perspectives, and learning to design and implement agile and effective interventions are just as important.

The key innovation of RAPTA is the synthesis of theory and practice across many domains and communities of practice, and it is not possible to reference the rich literature in a short guide. It extends and complements the Resilience Alliance Workbook for Practitioners (2010), the Stockholm Resilience Centre's Wayfinder program, and the work of the CSIRO climate adaptation and international development teams.

The following pages describe the approach and steps for implementing RAPTA.



How to use this guide

The guide provides an overview on how to address system resilience, adaptation and transformation in a consistent manner (e.g., to guide commissioning of new work, or develop the organisational skills and capacity needed to use the approach).

Experienced facilitators or practitioners may find the steps outlined in this brief guide are sufficient to undertake the components described. Additional materials are signposted [📖] to point to more detail to guide tailored delivery of the activities.

RAPTA can be used as a simple ‘checklist’ of what to cover when developing a project proposal or Terms of Reference. Its more detailed application is as an integrating framework to conduct research and synthesise multiple sources of evidence to guide the design, implementation and assessment of interventions to address complex problems.

This document has been designed to be flexible and adaptive to your needs. You may opt to either use the entire guide or just reference specific modules. While each module is designed to be a standalone document, we recommend you refer back to RAPTA on a page where needed.

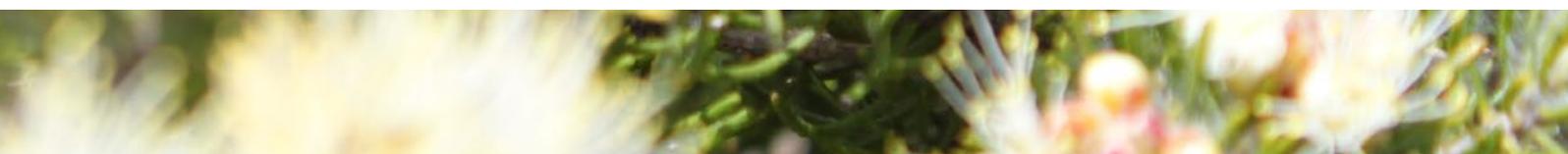
📖 For more information on the early development and piloting of RAPTA version 1 see O’Connell et al. (2016) and Maru et al. (2017) and the references therein.

📖 A growing list of worked examples, project case studies and papers will be added to the RAPTA home page www.research.csiro.au/eap/rapta/

RAPTA at a glance

RAPTA consists of three modules (People – dialogue, values, visions; Systems analysis; and Options and pathways to action) each with three components. The modules are supported by two continuous processes (*Active Learning* – establishing learning practices that build capacity for responding to rapid, unprecedented change; and *Adaptive Governance* – coordinating iterative, flexible and responsive interactions between the modules when designing the intervention and for its implementation and evaluation).

This leads to achieving specific sustainability goals underpinned by Resilience, Adaptation and/or Transformation pathways depending on the systems assessment. There are also many intermediate outputs from each of the modules and processes. The order of application of the modules and their components, and the specific methods used, are chosen and tailored to suit each context.



RAPTA on a page

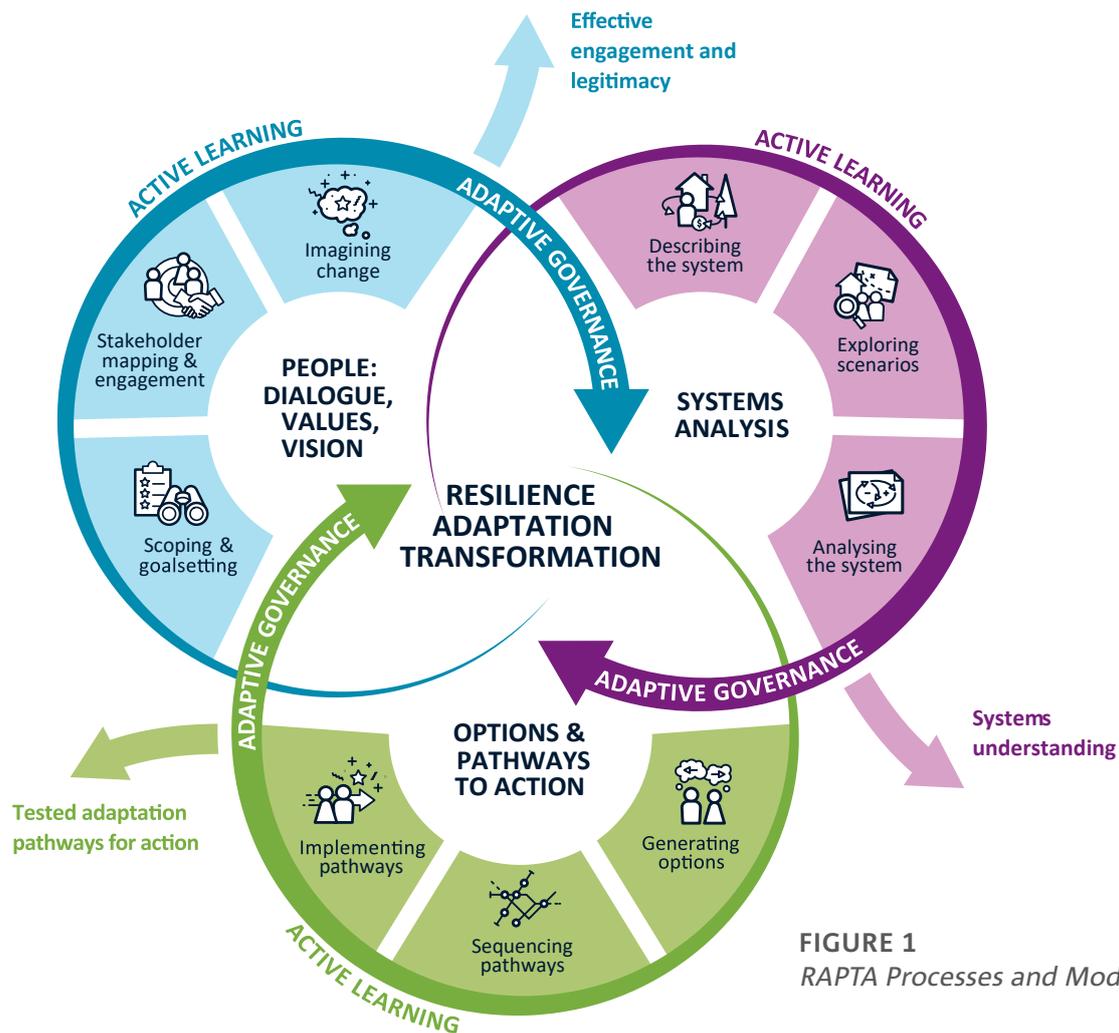


FIGURE 1
RAPTA Processes and Modules

RAPTA consists of three modules:

1. People – dialogue, values, visions
2. Systems Analysis
3. Options and Pathways to Action

The modules are supported by two continuous processes:

1. Active Learning – establishing learning practices that build capacity for responding to rapid, unprecedented change.
2. Adaptive Governance – coordinating iterative, flexible and responsive interactions between the modules when designing the intervention and for its implementation and evaluation.



People – dialogue, values, vision

Identify stakeholders, their roles and connections, and bring people together to set goals, imagine future change and participate in other RAPTA components.



Scoping and goalsetting

Establish the provisional purpose and nature of the work to position it in a wider context and time scale, identify previous work to build on, and allocate resources to the design process.



Stakeholder mapping and engagement

Bring together a set of key stakeholders in appropriate ways using ethical and transparent processes to provide salient and legitimate methods to design, implement and assess interventions, and to build capacity and agency.



Imagine change

Engage peoples' emotions, inspire hope and help individuals imagine change and recognise roles they can play in shaping their future by outlining broad pathways of change to achieve goals and vision.



Systems Analysis

Describe and analyse the system, recognise values and perspectives of diverse stakeholders, explore future scenarios, and identify uncertainties, stresses and shocks to assess resilience, adaptation and transformation and key points of intervention.



Describing the system

Elicit and build upon stakeholder knowledge to provide the basis to explore and understand the system and needs for resilience, adaptation or transformation.



Exploring scenarios

Use an evidence-based approach to analyse projected trajectories and plausible futures and test how broad pathways of change will fare in each plausible future.



Analysing the system

Conduct further explorations and analyses to characterise different plausible states and dynamics of the system, thresholds, feedback loops, and key points of intervention for building resilience, adaptation and/or creating opportunities for transformation at different scales.



Options and Pathways to Action

Identify intervention options and arrange them into a provisional order for implementation pathways. Estimate their qualitative and quantitative benefits and costs, assemble them into an implementation plan with triggers and alternative pathways, and take action.



Generating options

Explore and assess options according to their effectiveness in maintaining, adapting or transforming parts or all of the system to meet the defined goals, steer towards desired future states and stay away from undesired ones, while keeping future options open.



Sequencing pathways

Prioritise and sequence intervention options, alternative pathways and decision triggers for switching paths, addressing whether, where, when and how to start, as well as who should be responsible.



Implementing actions

Make effective decisions and actions, supported by *Adaptive Governance* processes and an implementation plan built on system understanding to realise planned pathways and deliver agreed goals, informed by ongoing learning.



Using RAPTA to design and manage interventions - especially if they involve large investments or effort - offers more than a standard project management approach.



Photography: Nicola Grigg



Process 1

Adaptive Governance

Why use this process?

Adaptive Governance helps you to deal with complexity, uncertainty and rapid change in legitimate, equitable and effective ways. It involves creating governance structures and processes that enable adaptability, trusted collaboration and *Active Learning*. This is achieved through establishing key roles, responsibilities, decision-making processes and accountabilities in the governance of intervention design, implementation and assessment.

Using RAPTA to design and manage interventions – especially if they involve large investments or effort – offers more than a standard project management approach. *Adaptive Governance* is a continuous process used to co-ordinate the application of RAPTA. *Adaptive Governance* also ensures that your approach is tailored to be effective in the wider system context, so that it can be adapted to match different phases of design and implementation maturity. To be adaptive when using RAPTA, mechanisms for acting flexibly on feedback from *Active Learning* are required, as are appropriate governance processes for making the most of that learning to benefit diverse stakeholders and enhance outcomes.

When Adaptive Governance is put into practice...



Outputs include:

- clear governance principles for system interventions
- transparent equitable processes, responsibilities and accountabilities and a shared understanding of the need for them.



Outcomes include:

- feedback and reflective learning practices embedded in decision making
- trusted cooperation and mitigation of power imbalances in the design, implementation and assessment of interventions
- flexibility and capacity to adapt and change while remaining accountable to stakeholder goals and values.



It differs from traditional approaches in the following ways:

- fair, context-sensitive and fit-for-purpose decision-making practices and governance of the design (RAPTA) process itself to meet the agreed goals for system resilience, adaptation and/or transformation, based on appropriate ethics protocols and evidence-based governance principles (e.g., principles that have emerged from research on management of common pool resources in social-ecological systems).



Photography: Deborah O'Connell

Steps

- 1.** Refer to *Stakeholder mapping and engagement*, which maps out social groupings and connections, power, political and cultural dimensions, to consider what effective and equitable governance will look like, who will be involved and their roles.
- 2.** When going through each module, iteratively set clear responsibilities, processes, and decision-making roles, guided by appropriate governance principles (e.g., principles for the sustainable management of common pool resources and/or for the inclusion of marginalised groups in decision-making). Ensure that responsibilities are supported by authority to make decisions and resource to implement them.
- 3.** Gain necessary ethics approvals according to stakeholder requirements and formalise the ethics protocol developed in *Stakeholder mapping and engagement* even if there are no formal ethics approval processes being enforced by stakeholders' organisations.
- 4.** Ensure the governance supports:
 - a.** co-ordinating the activities when implementing the various RAPTA components and any iterations. This ensures that RAPTA processes are transparent and conducive to *Active Learning*
 - b.** appropriate expertise and a role for a RAPTA facilitator that is matched to the social context and can catalyse change by being a 'keeper' of the process
 - c.** sufficient rigour and critical thinking to guide priorities for further data collection or analysis
 - d.** adequate resources, effective use of inputs and generation of useful outputs
 - e.** flexibility to deal with uncertainty, alternative ideas and change in response to learning and feedback.
- 5.** Adapt the governance arrangements for RAPTA as the work matures, revisiting the governance and modifying structure, processes, roles and membership of decision-makers as necessary.



Process 2

Active Learning

Why use this process?

Establishing *Active Learning* practices help you to build capacity for responding to rapid, unprecedented change for which there are no tested solutions. *Active Learning* involves learning by doing, reflecting and anticipating, using fit-for-purpose learning loops to adjust routines, reframe assumptions and strategies, and transform values or paradigms. It also provides for accountability through monitoring and evaluation processes and informs an adaptive process.

Deliberate learning throughout the RAPTA cycle enables revising and/or changing pathways in the design and implementation phases of interventions. *Active Learning* in RAPTA covers more than the usual intervention monitoring and evaluation approaches, with ‘triple loop’ learning as a core strategy to achieve required change:

- Single loop learning corrects and refines existing routines so they operate more effectively.
- Double loop learning reframes or reforms assumptions and strategies underpinning interventions or governance processes.
- Triple loop learning challenges and changes the established ways of doing things, dominant paradigms, power relations and values.

When Active Learning is put into practice...



Outputs include:

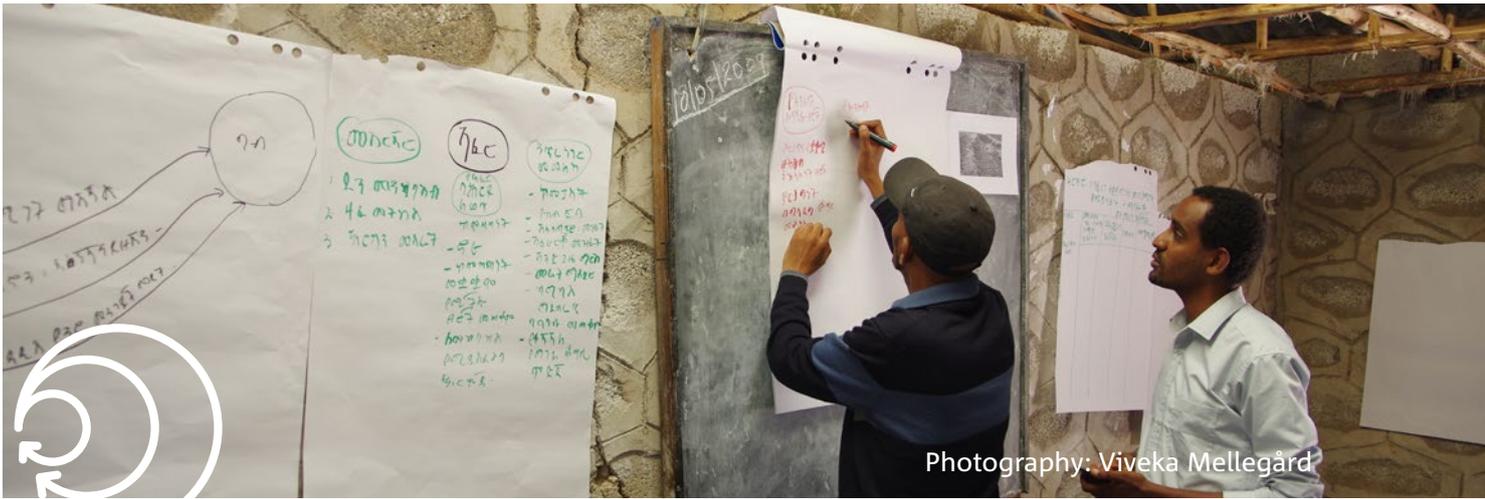
- a learning, monitoring and assessment framework
- indicators and metrics for reporting progress
- learning notes or reflections.

Outcomes include:

- change in stakeholders’ mental models, behaviour and practice
- adjustments to all processes and outputs in RAPTA components
- clear, transparent and trusted accountability in decision-making.

It differs from traditional approaches in the following ways:

- a systems-based *Theory of Change* is used to develop formal monitoring and evaluation, while promoting “learning by doing” support so that actions can be taken even in conditions of high uncertainty
- learning is embedded in the design, implementation and evaluation of interventions so that interventions are readily updated and changed in response to new insights or events
- a learning orientation that is deliberate, active and incorporates triple loop to support the reframing required for transformative approaches.

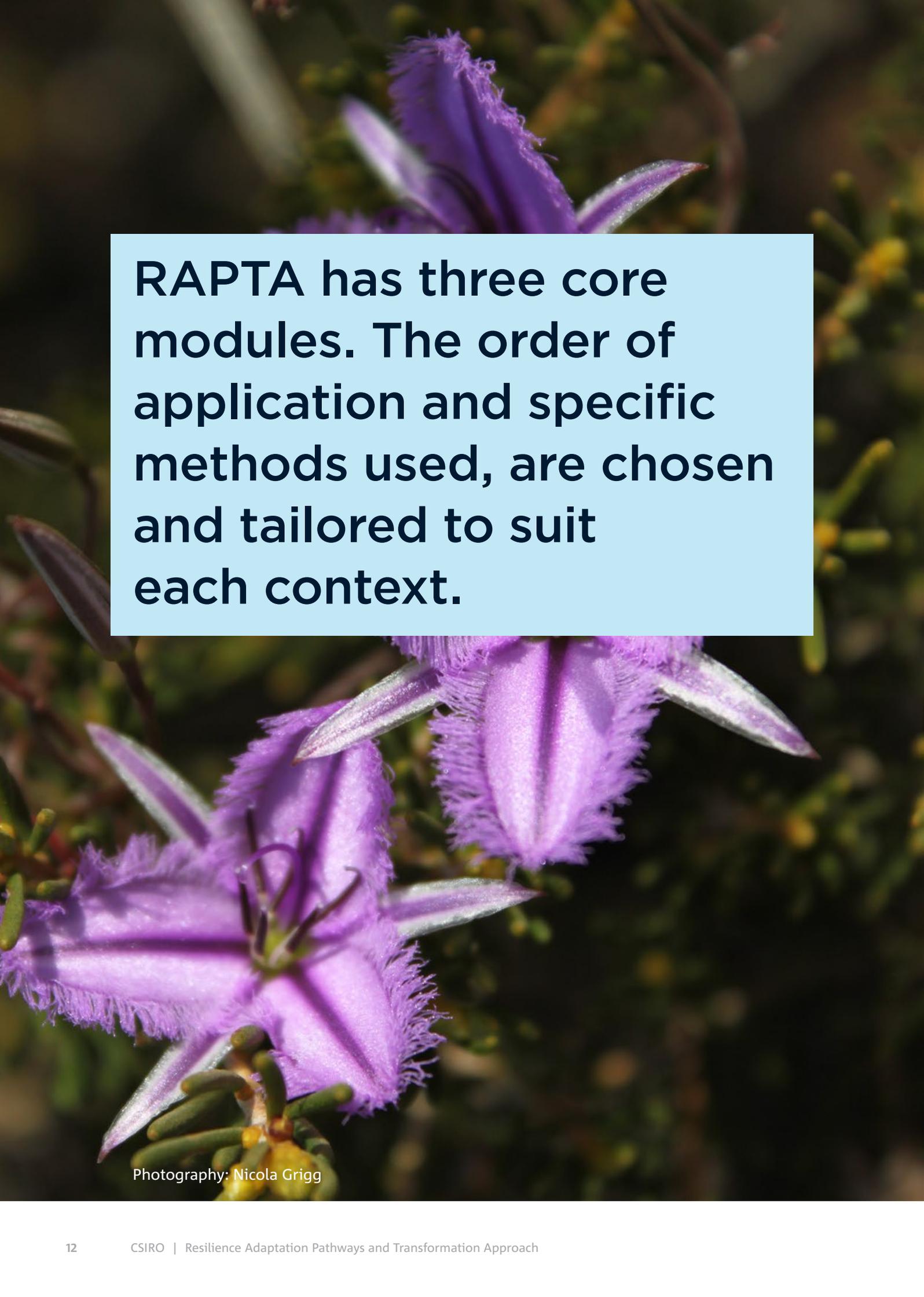


Photography: Viveka Mellegård

Steps

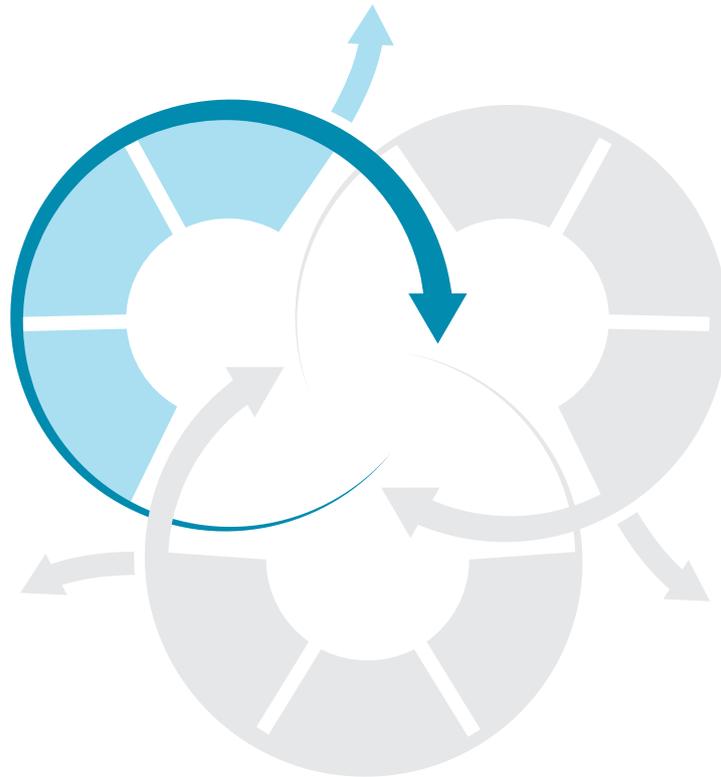
1. Identify the type and nature of learning required based on the complexity of the system, stakeholder learning orientations, and the kind of change that is needed (e.g., single loop learning could be sufficient for maintaining the current system, but double or triple loop learning are likely to be required for modifying or transforming the system).
2. Select appropriate learning, knowledge management, monitoring, and evaluation tools and methods to meet identified needs.
3. Create space and time to embed reflective learning practices in each of the modules of RAPTA, and identify mechanisms by which learning will be used to inform and revise RAPTA processes.
4. Specify monitoring, assessment and evaluation strategies for accountability and learning, guided by the *Theory of Change*, systems analysis and pathways.
5. Ensure learning from monitoring and reflection inform required changes in the design and implementation of interventions.

 See the Learning into the Future pages of Guide on Vulnerability www.aidr.org.au/media/6931/03-vulnerability.pdf

A close-up photograph of several purple flowers with fringed, star-shaped petals. The flowers are in sharp focus against a blurred background of green foliage and other flowers. The lighting is bright, highlighting the texture of the petals.

RAPTA has three core modules. The order of application and specific methods used, are chosen and tailored to suit each context.

Photography: Nicola Grigg



Module 1

People – dialogue, values, vision

Why use this module?

This module is used to identify stakeholders, their roles and connections, and bring people together to set goals, imagine future change and participate in other RAPTA components.



There are three components to this module:



1. Scoping and goalsetting



2. Stakeholder mapping and engagement



3. Imagining change

When this module is put into practice...



Outputs include:

- provisional goals, scope and resources needed for the project or intervention
- a systems-based Theory of Change that is revisited and revised as a living document, informed by and informing other RAPTA components as they develop
- a stakeholder engagement plan and ethics protocol.



Outcomes include:

- transparent stakeholder engagement processes that are held to account against ethical and other relevant criteria
- system understanding of the social context and stakeholder relationships
- capacity to think both logically and creatively about desirable futures and what changes might be needed
- provisional impact pathways and necessary partnerships for reaching goals.



It differs from traditional approaches in the following ways:

- support people to imagine and engage with the large novel and non-linear nature of change and uncertainty shaping the future
- promote ethical collaboration approaches with people as key agents in the system (beyond interested stakeholders, treated as shareholders in a linked human-natural system)
- meet stakeholders where they are and use RAPTA to scaffold from current practices to achieve resilient, adaptive and transformative outcomes
- understand the influence of power and politics in the systems of interest and implications for equitable outcomes
- make a place for expression of imagination, emotions, passion, empathy for others' perspectives and sharing of personal stories and experiences often neglected in logic-dominated thinking and processes
- elicit values across different groups and promote respect and appreciation for different, context-dependent and perhaps contested, values
- foster diverse kinds of knowledge alternative pathways for realising visions.



Scoping and goalsetting

Use this component to establish the provisional purpose and nature of the work you intend to complete. This component helps you to position that work in a wider context and time scale, identify previous work to build on, and allocate resources to the design process.

A key operating principle is to recognise, respect and build upon the diversity of stakeholders' values and current knowledge and practices.

Steps

1. Explore context, problems and aspirations of the stakeholders.
2. Set provisional scope, scale, location and boundaries.
3. Start to develop, modify or design goals depending on the situation;
 - a. these may be mandated goals in a 'top down' process that is less amenable to changing, or
 - b. these may be goals emerging from a 'bottom up' process, in which case it is often helpful to initially set these as provisional goals so they can be reviewed and revised after iterating through other RAPTA components that promote elicitation and deliberation with multiple stakeholders not yet involved as well as across jurisdictions and levels of decision making to develop shared goals.
4. Review past and current relevant work and consider how the intervention will build upon and/or be different from it.
5. Identify relevant stakeholders that ought to be engaged and involved in RAPTA modules i.e. for all stages of project design and implementation.
6. Scope and allocate resources for RAPTA components informed by the *Theory of Change*, available budgets, capacity and time.
7. After applying other RAPTA components: revisit and revise *Scoping* to reflect *Active Learning* from other components.



Stakeholder mapping and engagement

Use this component to bring together a set of key stakeholders in appropriate ways. This component shows you how to use ethical and transparent processes to provide salient and legitimate methods to design, implement and assess interventions, and to build capacity and agency.

Steps

- 1.** Conduct stakeholder mapping and network analysis: who will be affected by interventions and who needs to be involved (recognising this will change as more is learned in other modules)? Give particular attention to considerations of values, incentives, power, politics, governance, formal and informal decision-making, marginalisation, gender, different types of knowledge and who holds them, and identify potential ‘agents of change’ (those who can effectively catalyse or drive desired intentional change towards goals).
 - 2.** Explore a range of approaches to stakeholder engagement. Many methods and tools exist and can be used or tailored to the context, or new approaches can be designed to ensure voice and participation of the different groups identified in Step 1.
 - 3.** Assess the requirements for specific dialogue processes and facilitation skills to match the context, and the type and level of change required to reach the goals.
 - 4.** Consider and recognise the role of different types of knowledge, experience, and learning styles (e.g., visual, logical, emotional) to enhance engagement and participation.
 - 5.** Create an ethics protocol to ensure no additional risk to stakeholders through participating in the process, to provide an appropriate forum for respectful dialogue, and to assure appropriate confidentiality and informed consent.
 - 6.** Create a stakeholder map and engagement plan, addressing all of the above issues, and assess the relevance to various RAPTA components, including implications for *Active Learning* and *Adaptive Governance*.
-  See for an example of a well-designed engagement process for helping stakeholders to build their networks, knowledge and agency and reframe their thinking in the ‘Deconstructing Disaster’ pages of the Guide on Vulnerability www.aidr.org.au/media/6931/03-vulnerability.pdf



Imagining change

Use this component to engage people's emotions, inspire hope and help individuals *Imagine change* and recognise roles they can play in shaping their future. This component explains how to do this by outlining broad pathways of change to achieve goals and vision.

There are two complementary approaches which can be used in tandem:

- 1. Imagining the future** – use creativity and imagination to explore and share different desirable, undesirable and plausible futures.
- 2. Theory of Change** (sometimes called Impact Pathways or Change Pathways) – a mental model or a hypothesis of how and why change is anticipated to happen. Existing *Theory of Change* methods are enhanced by a systems view within RAPTA, and consideration of three broad types of change – building resilience, adaptation, and transformation – that help identify robust options for intentional changes in systems that are already experiencing novel, rapid or disruptive change and high levels of uncertainty.



Photography: Deborah O'Connell

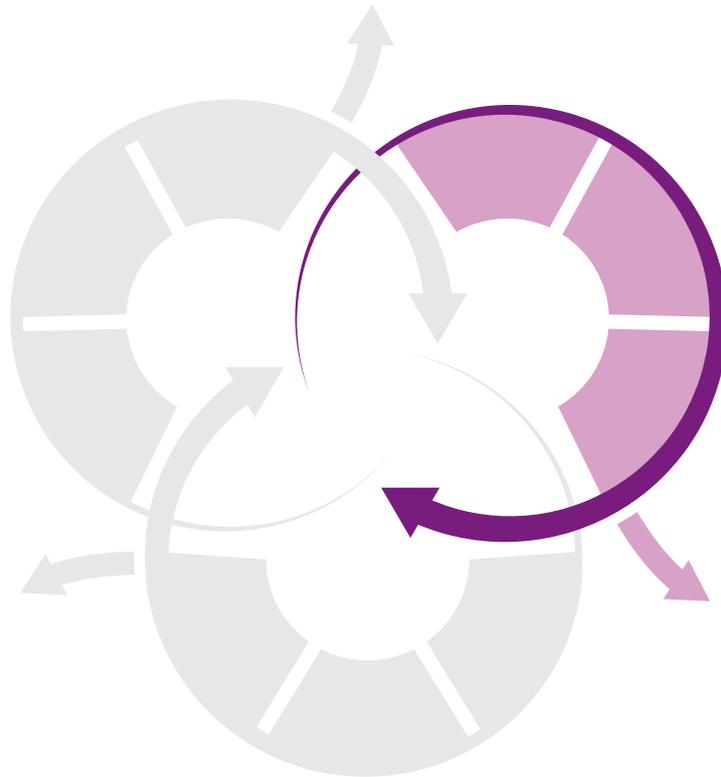


Steps: Imagining the future

- 1.** Use knowledge gained from *Stakeholder mapping and engagement* to identify appropriate methods and tools for this exercise. Consider using methods from the creative arts (e.g., interactive theatre).
- 2.** Conduct an engagement process to elicit values, visions and stories about the future, and to spark people's imagination to explore desired and undesired characteristics of plausible narratives of what could be.
- 3.** Summarise and document visions for the future and review *Scoping and goalsetting* if appropriate.

Steps: Theory of Change

- 1.** Revisit and refine goals identified in *Scoping and goalsetting*, and then work backwards from them to specify necessary and sufficient long-term, medium-term and immediate outcomes, outputs, activities and resources for achieving them.
- 2.** Describe the causal logic and assumptions, and organise into 'pathways' of impact. Create preliminary narratives to explain these in ways that engage and resonate with stakeholders (e.g., relate to narratives developed in *Imagining the future*).
- 3.** For impact pathways within scope, list the evidence that exists or is required to support the *Theory of Change*. Challenge existing assumptions and logic on how and why change could happen, and ensure key assumptions are plausible and valid.
- 4.** After taking a full system view, look within the remit of specific organisational requirements and intervention scope, and identify partnerships which might be necessary to lead or support impact pathways beyond that scope. Revisit this step as system understanding further develops in *Systems analysis*.
- 5.** Discuss the implications of the outcomes of the *Theory of Change* exercise on *Scoping and Goal Setting* (especially budget), *Stakeholder mapping and engagement*, *Adaptive governance* and *Active learning*. This process may be run iteratively with different groups of stakeholders, and will be revisited and modified throughout the process.



Module 2

Systems Analysis

Why use this module?

This module is used to describe and analyse the system, recognise values and perspectives of diverse stakeholders, explore future scenarios, and identify uncertainties, stresses and shocks. Systems Analysis assists with the assessment of key points of intervention and resilience, adaptation and/or transformation needs.



There are three components to this module:



1. Describing the system



2. Exploring scenarios



3. Analysing the system

When this module is put into practice...



Outputs include:

- a regularly-updated record of the current understanding of the system and underpinning assumptions and evidence (narrative descriptions, data, literature, and models). The description includes drivers, shocks, actors, resources and their uses, valued system components and products, controlling influences (biophysical and social) and their potential thresholds, within-scale and cross-scale linkages
- well-developed, meaningful scenarios built upon *Imagining change*, spanning diverse, plausible futures, and analysis of their implications for stakeholders
- a system assessment identifying risks, thresholds, key controlling influences, cross-scale linkages and opportunities for building resilience, adaptation or transformation.



Outcomes include:

- shared appreciation of diverse system perspectives (i.e., assumptions about how the system works) of different stakeholders
- an understanding of how cause and effect may unfold across sectors and scales in different futures, and potential points of intervention
- clarity on where to maintain, modify or transform the system to satisfy stakeholder values and aspirations across plausible future scenarios.



It differs from traditional approaches in the following ways:

- coupled human-natural systems are a core tenet
- incorporates interacting and cascading causes and consequences, key feedbacks, non-linearities, thresholds, uncertainties and cross-scale effects
- recognition of the interplay between values, formal and informal rules (or institutions), and knowledge as key influences in decision making for maintaining system resilience and/or options for adaptation or transformation
- seek and synthesise multiple perspectives drawing on different knowledge and evidence to identify robust insights, rather than rely a single “best” system analysis or oversimplified indicators.



Describing the system

Use this component to elicit and build upon stakeholder knowledge to provide the basis to explore and understand the system and needs for resilience, adaptation or transformation.

Ensuring descriptions are useful and meaningful to all stakeholders requires finding an appropriate balance between overly simplistic and unnecessarily complicated descriptions of the system, while also accommodating different depictions of the same system from multiple perspectives. Two complementary approaches are used in all of the steps:

- 1. Open inclusion.** Be open to multiple perspectives and mental models that stakeholders have of the system, including what they value from the system now and in the future, how they think it works, system drivers and shocks, key social-ecological relationships, institutions (formal and informal rules) and governance structures. Include qualitative and quantitative system descriptions such as datasets, analyses, models and stories.
- 2. Workable synthesis.** Use systems thinking to distil an evidence-based, workable synthesis of existing data, models and different knowledge types, noting where there are conflicting perspectives and critical knowledge needs.



Photography: Deborah O'Connell



Steps

- 1.** Identify what in the system is valued by stakeholders under different contexts and the issues or barriers in delivering these values now and in the future. Use appropriate methods to elicit and document values and any conflicts.
- 2.** Identify the drivers of the system – influences from outside the system that are not themselves influenced by the system – as well as potential shocks and key stresses (either externally imposed or emerging from internal system interactions).
- 3.** Describe the social and economic aspects, including institutions and governance of the system (i.e., rules), focusing on;
 - a.** social groups and social structure of system, cultural norms and unspoken rules
 - b.** livelihood strategies, economic sectors, interests and influences
 - c.** governance and decision making in the system – who makes what decisions and by what process? What values, rules and knowledge underpin decision-making processes?
 - d.** conflict resolution processes and levels of public trust in governance systems.
- 4.** Describe the biophysical aspects of the system (e.g., hydrology, ecology, and land use), focusing on key determinants of system structure (e.g., nutrient cycles or food webs), quantities ('stocks', such as area of land used for cropping) and rates of change ('flows', such as annual crop productivity).
- 5.** Describe key relationships between people and the biophysical system, how they generate the problems and attempts to address it using causal loop diagrams or models to identify feedbacks that amplify or dampen change (e.g., poverty traps in agricultural systems), as well as trends and thresholds (e.g., stocking density and debt-to-income ratio at which pastoral business becomes unsustainable or economically non-viable).
- 6.** Identify interactions with scales above and below the focal scale (e.g., thresholds at which food insecurity at household level increase likelihood of civil unrest and migration).
- 7.** Synthesise the current state of system understanding and supporting evidence, including characterisation of key points of consensus and disagreement, inconsistencies, uncertainties and needs for more rigorous analysis or further evidence.

 For more detail, see the Values Analysis, Systems Thinking and Values, Rules and Knowledge pages of the Guide on Vulnerability www.aidr.org.au/media/6931/03-vulnerability.pdf



Exploring scenarios

Use this module to apply an evidence-based approach in analysing projected trajectories and plausible futures. This component shows you how to test how broad pathways of change will fare in each plausible future.

Scenarios can be used to identify dissonance between the characteristics and values of the futures that people desire, and plausible futures based on current trajectories, drivers and possible interventions. This is an important foundation for choices that stakeholders will navigate in *Options and Pathways to Action*.

Steps

- 1.** Build upon engagement methods and forums identified in *Stakeholder mapping and engagement* to facilitate participatory scenario development and exploration.
- 2.** Work with stakeholders to define scenarios that span a range of plausible futures, including a worst case scenario and most likely scenario(s). Dimensions of change can be informed by key external drivers or potential shocks identified in *Describing the system*, key uncertainties faced, and scenarios established by others (e.g., IPCC climate change projections).
- 3.** Depending on the models, data and capability used in *Describing the system*, use appropriate approaches to explore scenarios and their implications.
- 4.** Use vision exercises (such as conducted in the *Imagining change* module), identify tensions or dissonance between aspirational desired futures and the more likely (often undesired) future trajectories if no changes are made. Facilitate stakeholder reflection on scenario analysis results. Reflections can include:
 - a.** the desirability of each scenario
 - b.** how different stakeholders would behave and fare if they found themselves in any of these futures
 - c.** how the imagined futures from *Imagining change* compare with the range of scenarios
 - d.** assess how initial impact pathways from the *Theory of Change* perform in different scenarios, and prioritise pathways that improve the likelihood of desired futures across the full range of scenarios.



For more detail, see the Guide on Scenarios at

www.aidr.org.au/media/6932/04-scenarios.pdf



Analysing the system

Use this component to conduct further explorations and analyses to characterise different plausible states and dynamics of the system, thresholds, feedback loops, and key points of intervention. This component focuses on system analysis as a means for building resilience, adaptation and/or creating opportunities for transformation at different scales.

Other assessment methods such as vulnerability or risk assessments, or triple bottom line analysis may have been conducted previously or are required for other reasons, and this component can be tailored to contribute to or build upon these other assessments. It also builds on material from *Describing the system* and *Exploring scenarios* and should identify knowledge needs and gaps, guiding where more rigorous evidence or analysis effort is needed.

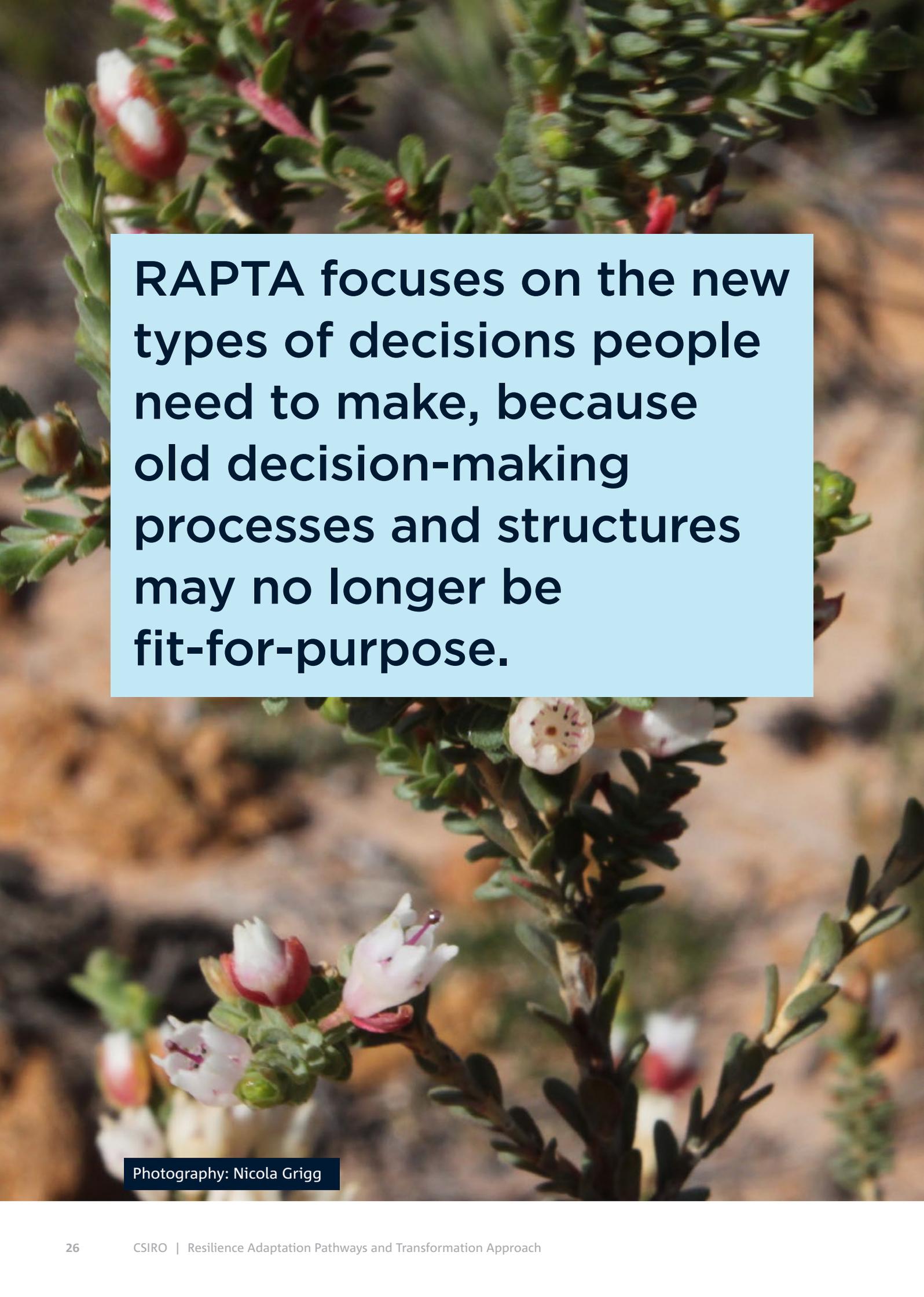


Photography: Deborah O'Connell



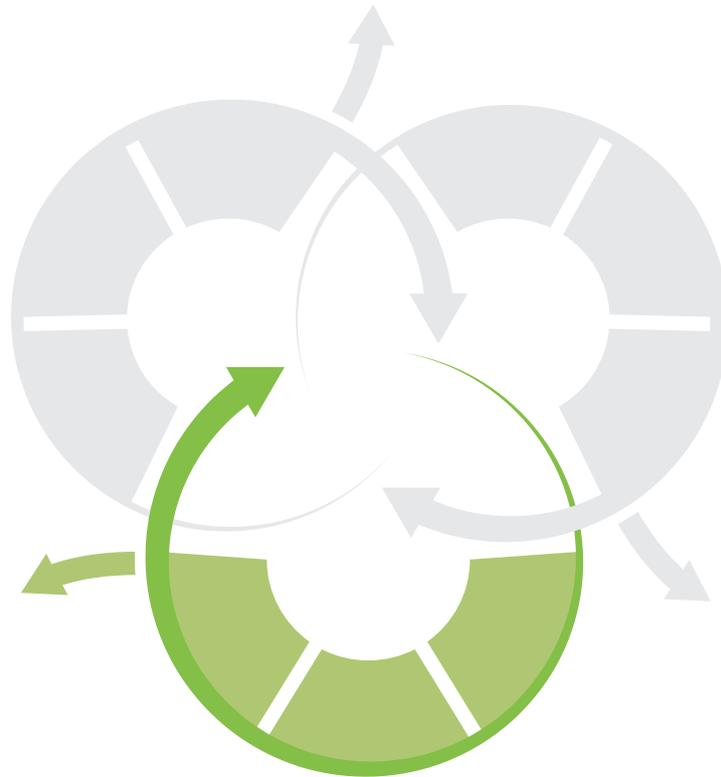
Steps

- 1.** Assess the general resilience or adaptive capacity of the system to cope with unknown risks, trends and shocks. Approaches include:
 - a.** identify what has conferred coping capacity in the past, or use outputs from Step 2 to identify attributes that confer resilience across many different kinds of shocks. Develop a stakeholder-derived account of where the system is considered to be weak and strong in terms of capacity to deal with disturbances
 - b.** look to published lists of indicators of general resilience and adaptive capacity and assess their relevance to the system.
 - 2.** Assess specified resilience – resilience ‘of what, to what, for whom?’ for specific risks, trends or shocks
 - a.** identify key variables, trends and thresholds, along with the likelihood of thresholds being crossed.
 - b.** develop shared understanding among stakeholders of the kind of shocks they can expect, critical thresholds and system properties that promote recovery.
 - 3.** Identify key points of intervention in the system using causal loop diagrams, qualitative and quantitative models or other suitable methods.
 - 4.** Check conclusions against evidence and multiple stakeholder perspectives.
 - 5.** Identify potential benefits of maintaining the current system and where incremental or transformative changes are needed:
 - a.** which parts of the system are satisfying values and aspirations and can continue under future projections, suggesting a need to build resilience to maintain system identity?
 - b.** which parts of the system would need minor adaptive changes to maintain the capacity to deliver values in future?
 - c.** which parts of the system are anticipated to experience large structural or transformational changes, and so require deliberate transformational actions by stakeholders?
 - 6.** Summarise resilience status and needs for building resilience, adaptation and/or transformation.
-  For further tools on systems thinking see The Systems Thinker www.thesystemsthinker.com/topics/archetypes and www.thesystemsthinker.com/systems-archetypes-i-diagnosing-systemic-issues-and-designing-interventions
-  For further tools on resilience assessment see Wayfinder at wayfinder.earth.org Resilience Alliance Workbook (2010)



RAPTA focuses on the new types of decisions people need to make, because old decision-making processes and structures may no longer be fit-for-purpose.

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Module 3

Options and Pathways to Action

Why use this module?

This module is used to identify intervention options and arrange into a provisional order them for implementation pathways. This module demonstrates how to estimate qualitative and quantitative benefits and costs, assemble them into an implementation plan with triggers and alternative pathways, and take action.



There are three components to this module:



1. Generating options



2. Sequencing pathways



3. Implementing pathways

When this module is put into practice...



Outputs include:

- intervention options informed by system analysis and assessment
- a clear, provisional sequence of targeted and flexible interventions for promoting learning about the system, building and enabling agency and capacity, and actions for changing the system to avoid undesirable states and to promote the realisation of the vision and agreed goals
- an implementation plan with alternative pathways and triggers for taking action.



Outcomes include:

- trust and confidence in decisions and actions
- changed practices (e.g., day to day decisions on investment, how to do things, behaviours) and institutions (formal rules such as policies)
- capacity to adapt and transform as needed
- evidence of progress towards goals.



It differs from traditional approaches in the following ways:

- linked pathways that enable stakeholders to take action towards agreed goals under uncertainty, with the capacity to take alternative options and paths as more is learned and conditions change.
- design, implementation and assessment of options and pathways is supported by *Adaptive Governance* and *Active Learning* to support resilience, adaptation and/or transformation in the face of uncertainty and rapid or unexpected change.
- a focus on identification of system options and pathways even if they lie beyond the scope and funding duration for the current intervention being designed or managed using RAPTA.
- focus on decision makers, types and processes needed to enable desired future options. Rapid, novel change will require fundamental shifts in how, what and where decisions are made. Decision-making structures and processes are set up for past or current conditions, and may not be fit-for-future.



Generating options

Use this component to explore and assess options according to their effectiveness in maintaining, adapting or transforming parts or all of the system to meet the defined goals, steer towards desired future states and stay away from undesired ones, while keeping future options open.

It is useful to employ imagination, creativity, ‘out of the box’ thinking and experimentation to explore novel options. Follow up with evidence-based testing of options against a range of criteria for feasibility, salience, legality, legitimacy, credibility, fairness, priority, benefits and costs.

Steps

- 1.** Identify what types of intervention options are needed in the system to address identified problems. These could include options that:
 - maintain the system in the short-term while longer-term interventions are being developed
 - build resilience to avoid crossing points of no return or other unwanted thresholds
 - enable the system or parts of it to adapt or transform.

Multiple options are likely to be needed at different spatial scales and at different times. Use this step to generate many different kinds of options for interventions, drawing on all other components and using creative processes to encourage imaginative and innovative thinking.
- 2.** Assess options using the following guiding questions to better understand and prioritise them. Where answers are uncertain or ambiguous it highlights the need for options that are about learning and improving system understanding:
 - is it a foundational intervention, i.e., an intervention that must be implemented if other interventions are to work?
 - is it to prevent a threshold being crossed?
 - is it resilient or robust to a wide range of scenarios, and potential stresses or shocks?
 - will it impact on other options?
 - will there be a long delay between implementation and effect?
 - is it necessary but not yet feasible, salient, legal, legitimate or credible?
 - is it fair and will it build social cohesion?
 - is the set of options sufficient to achieve the desired changes?



Photography: Fabian Sack

- 3.** Use the following principles to characterise benefits and costs of intervention options:
 - estimate the benefits and costs of each option for each stakeholder group, noting that each option may have effects beyond the group it is designed to benefit
 - describe unquantifiable benefits and costs and do not assume that because they have no monetary value or physical expression that they are less valuable than the tangible benefits and costs
 - characterise any losses and trade-offs necessary to realise long-term net benefits
 - make clear statements about potential benefits, costs, risks and uncertainties of crossing a threshold, and potential impacts on stakeholders, especially future generations.
- 4.** Conduct the above steps for the different scenarios developed in *Exploring scenarios* to identify options that are robust to different plausible futures.



Sequencing pathways

Use this component to prioritise and sequence intervention options, alternative pathways and decision triggers for switching paths, addressing whether, where, when and how to start, as well as who should be responsible.

Candidate options for interventions are placed in a provisional order for implementation, informed by criteria for sequencing options, and outputs from other components, including understanding key points of intervention and the implementation pathways identified in the *Theory of Change*. The pathway is designed to be flexible and readily adaptable to cope with the unexpected, informed by feedback from *Active Learning*.

Steps

1. Specify the requirements and lead times required to implement options, including decisions that would need to be made, and any rules that would need to change.
2. Lay out a range of options based on performance against projected changes in the system (*Imagining change* and *Exploring scenarios*) and the evaluation criteria (*Generating options*), and develop workable sequences for implementing options.
3. Identify decision points, and set provisional implementation triggers for each pathway.
4. Document and visualise alternative pathways for implementing changes as a route map or some other visualisation.



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Implementing pathways

Use this component to prioritise and sequence intervention options, alternative pathways and decision triggers for switching paths, addressing whether, where, when and how to start, as well as who should be responsible.

The logic of the *Theory of Change*, and knowledge gained about the system in other components is used to develop an implementation plan that is responsive to feedback from *Active Learning* and adaptable to changing circumstances. Stakeholders who are instrumental in implementation should be closely involved in the *Adaptive Governance* and *Active Learning* modules.

It is common for initial implementation funding to cover only short-term actions. The adaptive implementation pathway extends well beyond individual projects or policy initiatives and often decades into the future, so it should include actions to ensure sustainable governance and further resources for longer term actions.

Steps

1. Build the understanding gained from all components into an implementation plan, ensuring that there is compatibility/ congruence between the range of actions generated by the all components of RAPTA.
2. Action the implementation plan according to processes and outcomes from *Adaptive Governance* and *Active Learning*.
3. Re-iterate and revise components of RAPTA as appropriate to ensure sufficient rigour to provide stakeholder trust and confidence in investment and actions, and to adapt pathways as the future unfolds.

 For worked examples of designing interventions see Section 5.4.2 of (O’Connell et al., 2018)

 For further tools on Values, Rules and Knowledge see Gorddard et al., 2016

 For understanding the concept of adaptation pathways (Wise et al., 2014, Abel, 2016, Enfors, 2013)

 See adaptation pathways based on systems analysis and vulnerability/resilience loops for remote communities in Australia (Maru et al., 2014)



References

Abel, N, Wise, RM, Colloff, MJ, Walker, BH, Butler, JRA, Ryan, P, Norman, C, Langston, A, Anderies, JM, Gorddard, R, Dunlop, M & O’Connell, D 2016, *Building resilient pathways to transformation when “no one is in charge”*: insights from Australia’s Murray-Darling Basin, *Ecology and Society* 21(2):23.

Australian Government, Department of Home Affairs 2019, *Climate and Disaster Risk: What they are, why they matter and how to consider them in decision making*, 3 *Guide on Vulnerability*

Enfors, E 2013, *Social–ecological traps and transformations in dryland agro-ecosystems: Using water system innovations to change the trajectory of development*. *Global Environmental Change*, pp. 23, 51-60.

Gorddard, R, Colloff, MJ, Wise, RM, Ware, D & Dunlop, M 2016. *Values, rules and knowledge: Adaptation as change in the decision context*. *Environmental Science & Policy*, pp 57, 60-69.

Maru, Y, O’Connell, D, Grigg, N, Cowie, A, Stone-Jovicich, S, Butler, J, Wise, R, Walker, B, Million, AB, Fleming, A., Meharg, S & Meyers, J 2017, *Making ‘resilience’, ‘adaptation’ and ‘transformation’ real for the design of sustainable development projects: piloting the Resilience, Adaptation Pathways and Transformation Assessment (RAPTA) framework in Ethiopia*. Canberra, Australia: CSIRO.

Maru, YT, Stafford Smith, M, Sparrow, A, Pinho, PF & Dube, OP 2014, *A linked vulnerability and resilience framework for adaptation pathways in remote disadvantaged communities*, *Global Environmental Change*, pp. 28, 337-350.

O’Connell, D, Abel, N, Grigg, N, Maru, Y, Butler, J, Cowie, A, Stone-Jovicich, S, Walker, B, Wise, R, Ruhweza, A., Pearson, L, Ryan, P & Stafford-Smith, M 2016, *Designing projects in a rapidly changing world: Guidelines for embedding resilience, adaptation and transformation into sustainable development projects*, Washington, D.C.

O’Connell, D, Wise, R, Williams, R, Grigg, N, Meharg, S, Dunlop, M, Doerr, V, Meyers, J, Edwards, J, Osuchowski, M & Croweller, M 2018, *Approach, methods and results for co-producing a systems understanding of disaster: Technical Report Supporting the Development of the Australian Vulnerability Profile*, Canberra, Australia: CSIRO.

Wise, RM, Fazey, I, Stafford Smith, M, Park, SE, Eakin, HC, Archer Van Garderen, ERM & Campbell, B 2014, *Reconceptualising adaptation to climate change as part of pathways of change and response*, *Global Environmental Change*, pp. 28, 325 - 336.

Resilience Alliance, 2010, *Assessing resilience in social-ecological systems: Workbook for practitioners*. Version 2.0, Online: www.resalliance.org/3871.php.



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