Behavioural Science for Climate Change Adaptation

A case of ecosystem-based adaptation in Fiji

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1.0 Why Climate Change Adaptation Solutions Are Not Implemented at Scale

Several factors prevent countries from accelerating the implementation of climate change adaptation (hereafter climate adaptation) solutions. The lack of financial resources and uncertainties associated with future climate risks are not the only barriers to implementing and scaling up climate adaptation measures.

One barrier that has largely been left unaddressed relates to designing and implementing climate adaptation measures in a way that effectively considers the drivers of behaviour—the factors that drive how, when, and why people make decisions and take action. This is a major hurdle, considering that adapting to the impacts of climate change requires *doing* things differently on both an individual and a collective level—from how households make a living or how communities manage their ecosystems to how governments make investments. Therefore, addressing the drivers of behaviour can improve the effectiveness, the acceptability, and the sustainability of climate adaptation interventions.

However, behavioural change is complex. First, various historical, politico-economic, sociocultural, and psychological factors can shape people's decision-making processes. Second, people's actions must be situated within a decision-making system comprised of multiple actors, including governments, development partners, civil society organizations, the private sector, communities, and individuals, all facing unique incentives. Third, our assumptions about how people make decisions are often disconnected from reality, leading to suboptimal or ineffective interventions (Rare & the Behavioural Insights Team, 2019).

For example, both conscious and unconscious processes, such as habits, emotions, biases, and social influence, impact people's decisions. Still, most of our decisions deviate from the predictions of rational choice theory (i.e., the basis for neoclassical economics) or even our own conscious deliberation. This means that when people understand the relevance of a specific solution and shift their attitudes or intentions toward this solution, it is often not enough for them to adopt the solution (Rare & the Behavioural Insights Team, 2019).

Nonetheless, interventions designed to change behaviour tend to overlook and oversimplify these and other facts about human behaviour. The growing field of behavioural science, which draws insights from across disciplines such as psychology and behavioural economics, can close this gap and help ensure that climate adaptation initiatives are informed by a deep understanding of human behaviour.

The general logic of designing interventions informed by behavioural science consists of mapping the drivers promoting or hindering a target behaviour (such as the adoption of a particular climate adaptation solution) and then designing and piloting interventions that address the most important drivers.

The Intergovernmental Panel on Climate Change's (IPCC's) *Assessment Report Six* (IPCC, 2022) recognizes the importance of understanding the behavioural dimensions of climate change adaptation. The report also points to our limited understanding of the psychological and socio-cultural factors that influence the adoption of climate adaptation solutions, particularly in the Global South.

The purpose of this analysis is to strengthen the evidence base for applying behavioural science to intervention design to scale up the adoption of climate adaptation solutions at the community level. This report has been prepared primarily to inform development practitioners and researchers working on climate change adaptation.

The central question that guides this analysis is: How can behavioural science help governments and development partners scale up the adoption of climate adaptation measures at the community level? To explore this question, we use a case study, which is described in the next section.

2.0 The Case of Vetiver Grass for Riverbank Rehabilitation Against Flood Risks in Fiji

Case Study Background

To investigate how to practically address behavioural change in climate adaptation, we focused on a past ecosystem-based adaptation (EbA) project implemented by the Fijian government. EbA, also called nature-based solutions for adaptation, is an approach to adjusting to the impacts of climate change that focuses on protecting, restoring, and enhancing ecosystem services while improving communities' well-being. While not new, this approach is currently gaining a lot of traction globally, including in small island states (IPCC, 2022). The Fijian government is seen as a leader on this topic because it recognizes the need to prioritize EbA in key strategic policy documents, such as in its National Adaptation Plan (Government of the Republic of Fiji, 2018).

The case study sought to explore the behavioural variables that could have contributed to or impeded the adoption of vetiver grass for riverbank rehabilitation against flood risks among target communities.

Riparian zones are critical to biodiversity and soil and water quality conservation. For Fijians, riverbanks are also an important source of food and income, given their rich soil and accessibility. As a result, a large part of the Fijian population lives near riverbanks; however, flooding associated with riverbank erosion is a major issue in Fiji, and these communities are highly vulnerable to land erosion and fluvial floods (Government of the Republic of Fiji, 2017). Riverbank erosion leads to the loss of scarce agricultural land, damage to key infrastructures and services, and human displacement. This is caused by a combination of factors, including unsustainable land use and river management, such as vegetation overclearing and gravel extraction, as well as intense rainfall. In the Pacific region, floods are expected to increase in the future due to more intense rainfall and cyclones in the context of climate change (Commonwealth Scientific and Industrial Research Organisation & Secretariat of the Pacific Regional Environment Programme, 2021).

To address these interrelated challenges, the Fijian government identified vetiver grass planting as a cost-effective EbA solution for riverbank erosion control against flooding.

The use of vetiver grass (*Chrysopogon zizanioides* or "Sunshine") as a vegetative barrier for soil and water conservation was first introduced in Fiji in the sugarcane plantations in the 1950s (Truong & Creighton, 1994). It is a non-invasive species of grass with a fast-growing and deep root system that helps stabilize the soil on which it grows (Institute of Pacific Islands Forestry, 2018). It is a robust solution to manage climate uncertainties because of its tolerance to both prolonged drought and waterlogging (Institute of Pacific Islands Forestry, 2018). Since 2015, the Fijian government has been supporting the planting of vetiver grass for coastal and riparian zone restoration across various communities. Between 2015 and 2022, the government did not conduct any formal monitoring and evaluation of the level of adoption of vetiver grass for riverbank rehabilitation (Staff of the former Ministry of Waterways, personal communications, July 2022).

Methods

We selected four rural Indigenous Fijian communities living along the Wainibuka River in Tailevu province, Central Division. Three communities (Naveiveiwali, Malabe, Nabouva) were selected because they received support on vetiver planting from the former Fijian Ministry of Waterways between 2018 and 2020. One community (Naqia) was selected as a comparison site because, while it is located near the other villages, it did not receive support on vetiver grass planting from the government. The four sites shared similar socio-cultural, economic, and environmental characteristics.

Data collection for this study was conducted in February and March 2023 by three senior community experts from Fiji specializing in forestry, community engagement, and biodiversity conservation and fluent in the i-Taukei (Indigenous Fijian) language. The study involved a multi-method approach across the four rural villages. The team conducted village transect walks and used participatory mapping to gain a spatial understanding of the communities and areas considered at risk of riverbank erosion and flooding. Three focus group discussions in each village were held with women (n=28 across all three villages), men (n=34), and youth (n=25). Additionally, semi-structured household interviews were conducted with 97 households, representing approximately 58% of the estimated 168 households across all sites, with an equal gender representation of 50% female and 50% male respondents. To gather insights on previous interventions, semi-structured interviews were conducted with 12 government and development partner experts at the national and provincial levels. The study also included a comprehensive review of existing literature on vetiver grass in Fiji, including reports from the former Ministry of Waterways.

The data was analyzed using a combination of inductive and deductive reasoning approaches as a two-step process to understand what motivated or impeded the adoption of vetiver grass in the selected villages. First, inductive reasoning helped identify emergent themes and insights related to community perceptions of past interventions and their current usage of vetiver grass along the riverbanks. These insights revealed key behavioural variables, which were then systematically categorized into broader behavioural themes according to the Behavioural Drivers Model (BDM) developed by UNICEF in 2019 (Petit, 2019). Various typologies of factors influencing behaviour exist (Williamson et al., 2020) with no widely agreed classification, including in the field of climate adaptation. Although the BDM framework is

not tailored specifically for climate change adaptation, it was chosen for its comprehensive typology, providing a structured framework to interpret the identified variables.

Second, looking specifically at key behavioural variables identified in past work on climate adaptation (van Valkengoed & Steg, 2019), we further refined our analysis. This deductive step allowed us to align early insights with established behavioural determinants, such as social norms, beliefs, and perceptions of efficacy. This methodical integration of inductive and deductive reasoning enabled us to effectively triangulate the data, pinpointing precise motivators and barriers for adopting vetiver grass within these communities.

A key assumption throughout our analysis was that the use of vetiver grass for riverbank rehabilitation against flood risks meets the three criteria of EbA in the selected locations: it brings benefits for community well-being, biodiversity conservation, and climate change adaptation. We also assumed that vetiver grass is currently the most cost-effective solution to promote at the community level for riverbank rehabilitation.

3.0 Main Drivers of Behaviour for Using Vetiver Grass

Between 2019 and 2020, the former Ministry of Waterways implemented a project called Vetiver Grass Nursery for River Bank Stabilisation and Sustainable Management of Land and Water Resources. A review of the former ministry's project monthly progress reports and achievement report for the period 2018–2020 indicates that the government supported vetiver planting in the three villages of Naveiveiwali, Malabi, and Nabouva, with (respectively) 250 metres, 800 metres, and 250 metres of vetiver planted along the riverbanks. The project documents and interviews with key experts at the national level further indicate that through the project, the government deployed a one-off intervention in the villages based on three activities:

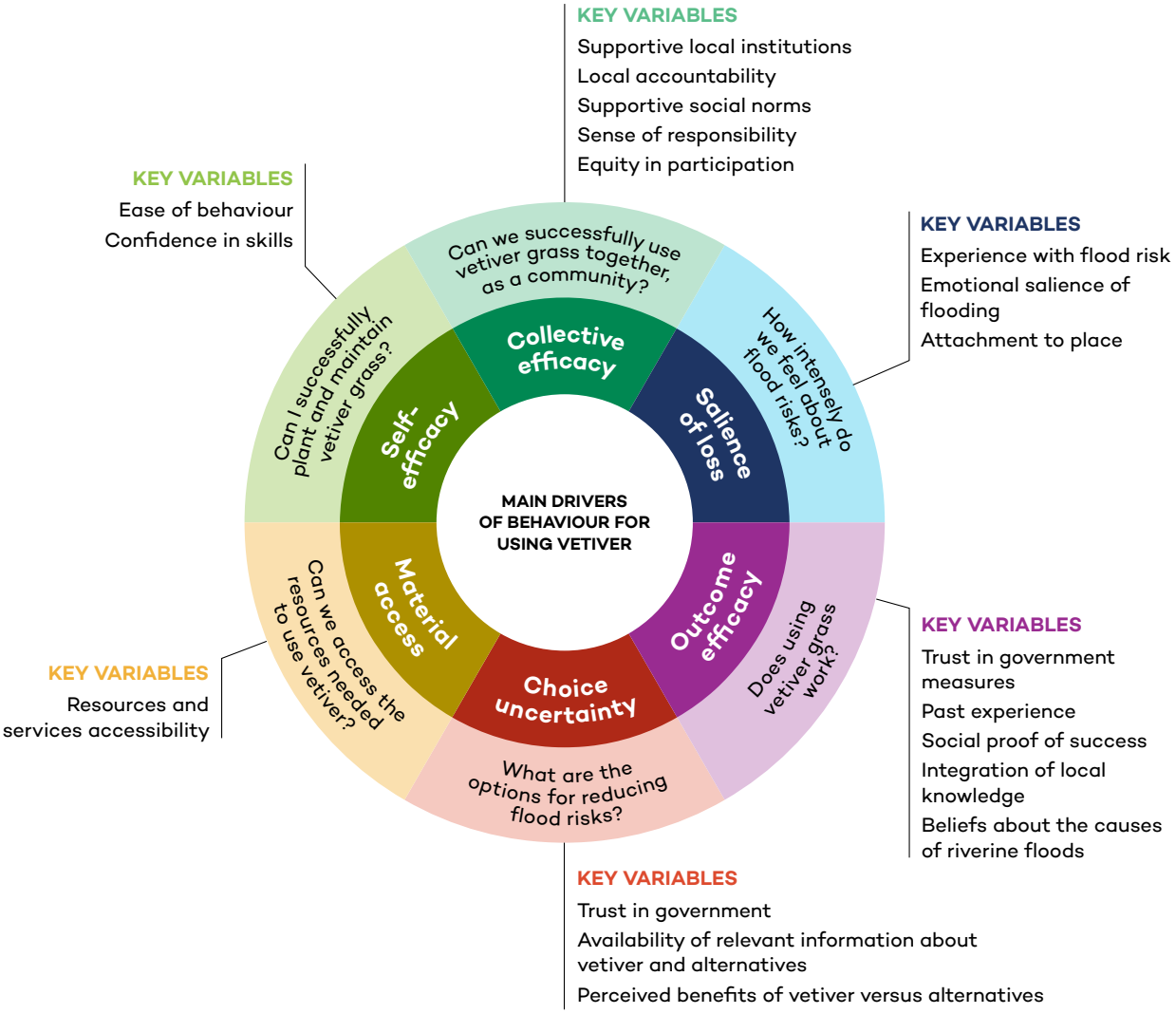
- provision of free planting materials (vetiver seedlings) through the establishment of a new vetiver grass nursery at the provincial level;
- payment for ecosystem services, meaning that each village—through existing community groups—got paid to collectively plant vetiver along the riverbank; and,
- provision of an awareness-raising session on vetiver planting targeted at men and young people.

A key assumption in the government intervention was that communities would be responsible for vetiver planting and maintenance with limited support from the government.

Three years after the end of the project in 2023, direct observation conducted in the selected villages revealed that there was no uptake of the vetiver along the riverbanks in the selected communities. Only a few remnants were visible, and communities mentioned that most vetiver plants were left unattended and got washed away.

Our analysis of the focus group discussions and semi-structured interviews identified 19 variables relevant to the adoption (or non-adoption) of vetiver grass, which we grouped into six "main drivers of adoption" (See summary in Figure 1 and a more detailed description of the 19 variables in Appendix A). The three senior field experts then reviewed these drivers to validate whether or not these insights resonated with their experience in the field. The drivers are detailed below, with relevant themes and quotes illustrating the findings.

Figure 1. Summary of the main drivers influencing the adoption of vetiver grass for riverbank erosion control against flooding in the selected communities in 2023



Source: Authors.

Salience of Loss

Salience of loss refers to the emotional and cognitive responses individuals had toward flood risks and riverbank erosion. When discussing vetiver, several aspects repeatedly surfaced. Participants frequently mentioned **experience with flooding and erosion**, noting that riverine erosion and flooding seemed to be becoming more frequent and intense. For example, one respondent noted, "The floods have become more often than normal [and] more intense, and the currents are way more swift and bold now that it eats away at our riverbanks every time it floods," with another saying, "We are very concerned that our village is going to be washed off one day. The flooding is occurring more regularly now as the river has become shallow and wider in some places where erosions have happened. The erosion keeps moving inland; we are concerned that one day it is going to take away houses too."

These comments tied into the **emotional salience of flooding**, which was also a recurring theme. Participants expressed strong negative affect related to the impact of riverine erosion and flooding on their lives and those of others. What was particularly salient was the way participants referred to the loss of land as a direct loss of their cultural identity. Their **attachment to place** was obvious, with respondents' cultural identity being closely linked to their territorial domain, including the riverbank, heightening their concern about erosion. For example, one participant said, "[The riverbank] is also a place where we rest and talk about our issues, it's a bonding place for us women while we're washing, fishing, or harvesting vegetables," while another respondent mentioned, "The riverbanks are eroding fast, and we are losing land. Land is an important inheritance culturally as the size of the land depicts the strength of the clan."

Interestingly, despite experience with flooding, emotional salience of flooding, and their attachment to place, the villagers did not adopt vetiver grass. This suggests that these variables are not (at least by themselves) sufficient to motivate the target behaviour.

Outcome Efficacy

Outcome efficacy referred to individuals' beliefs about the effectiveness of vetiver grass as an erosion control solution. When discussing vetiver, **past experience** often came up, with some community members perceiving past attempts at planting and maintaining vetiver as failures. We heard respondents saying, "We've seen our riverbanks eroded too with the vetiver and this is discouraging," or "Most of the vetiver planted there got washed away." Another group mentioned that they believe that "to some extent [vetiver] will help but it must be complemented by other tools or ways." These perceptions would then likely be reinforced by villagers' confirmation bias, the human tendency to focus—or place undue importance—on past negative experiences with vetiver and overlook or dismiss instances where it might have been successful, reinforcing any belief in its ineffectiveness (or serving as an excuse not to try again).

Social proof of success (or lack thereof) was frequently mentioned, with respondents emphasizing the importance of observing outcomes in their own and nearby communities. For example, one participant stated, "[Community members show a] lack of interest as we haven't seen evidence yet that it works as a control to erosion," while another noted

> [w]e didn't have training, but we've since learnt from nearby villages about the life cycle of the vetiver grass and its strength. From what we've heard, we think it is going to be good for our riverbanks and slopes as well as our plantations. We want to continue with vetiver but also want to know what other interventions are out there that we can probably choose from.

Observations of nearby communities that successfully planted and maintained vetiver seemed to motivate those interviewed.

Trust in government measures was highlighted as a factor influencing people's perceptions of vetiver's outcome efficacy. The government was often blamed for not implementing vetiver planting programs effectively or for causing other issues that led to skepticism about

the potential success of top-down interventions. In a similar vein, many statements from focus group participants highlighted a need for better **integration of local knowledge** and consultation with villagers since they can provide input that could make or break a solution. For example: "We believe [vetiver] has hugely benefited the village and the riverbanks. The part that got eroded with vetiver is due to the water backlog from the island. That part may need another intervention." Beyond this focus on outcomes, many felt that the proposed solutions ignored their own **beliefs about the causes of riverine erosion**. For example, all women in one focus group blamed "the drainage systems by the newly constructed public roads as the main cause of erosion in the village and riverbanks." In their view, flooding could be reduced by fixing the drainage system rather than fixing the downstream problem of erosion. Another resident mentioned that "water is a living thing, and it is angry with our irresponsible use of its resources like the gravel extractions."

Choice Uncertainty

Choice uncertainty involved the perceived lack of clear information about the options available for reducing flood risks. While vetiver is one option, participants often wondered what other solutions might be available for the community to use. This uncertainty can diminish people's sense of agency—though having many options can also lead to status quo bias (Dean et al., 2017). Overall, respondents felt they lacked information about the choice set available to them and their outcomes, experiencing **choice set ambiguity**. Simply put, they were neither clear on all the options to fight erosion nor how these options compared to one another—or to doing nothing. As one participant said, "We want to continue with vetiver but also want to know what other interventions are out there that we can probably choose from."

In scenarios where such decisions could reduce farming land's immediate potential, combined with our human propensity for ambiguity aversion (i.e., we prefer known, predictable risks

over unknown, ambiguous ones), this uncertainty could be particularly problematic. The semi-structured interviews revealed that approximately 43% of respondents expressed uncertainty regarding the relative effectiveness of both hard and natural infrastructure, while opinions were evenly split on whether natural infrastructure like vetiver is more effective than hard infrastructure like walls. It was the same with the benefits of vetiver, with about half of respondents (48%) believing that planting vetiver would benefit them personally.

Qualitatively, respondents also noted a **perceived lack of relevant information** on vetiver itself, with comments such as, "[We've received] no trainings/awareness on vetiver grass and its benefits," and "we've heard about it during the community planting program but there was no training or awareness done." **Trust in authorities** was another recurring theme, particularly related to how much villagers trusted key messengers and their information. Additionally, 48% of respondents were unsure whether their current methods (i.e., existing rules) could protect their riverbanks.

Material Access

Material access referred to the availability and ease of obtaining vetiver grass and related resources, which impacted people's decisions and ability to adopt vetiver. Cost-benefit considerations were frequently mentioned, with respondents expressing concerns about the potential waste of money, particularly due to livestock grazing by the riverbank. As one respondent noted, livestock may "[damage] planted vetiver when the animal is tied to the plant" or directly by having "[a]nimals grazing on the young plants."

Respondents weighed the benefits of engaging in vetiver planting against the potential losses, effort, and time required. We all tend to discount future benefits, particularly when costs are immediate (i.e., we are present biased), and this was reflected in villagers' tendency to sometimes expect immediate compensation for maintaining the vetiver, with some highlighting "false [government] promises on cash incentives" for planting.

The importance of **resource and service accessibility** was also noted by respondents and in prior conversations with Fijian government representatives. For villagers to plant vetiver plants, they must have seedlings available to them. At the time of our field team's visit, no community nurseries existed, and villagers relied on the seedlings that the Ministry of Waterways had previously provided.

Collective Efficacy

Collective efficacy reflected the community's belief in their ability to work together effectively to adopt vetiver grass for erosion control. During discussions, participants emphasized the need for a strong **sense of responsibility** from all community levels and the importance of **supportive local institutions**. Some respondents lamented the lack of an active community group or committee specifically dedicated to addressing issues related to the riverbank, with one saying, "There is no form of organization around riverbank and environmental issues—there is no Environment Committee." Others highlighted how their community took responsibility: "The maintenance, namely the weeding and pruning of the vetiver, is part of

the monthly village cleanup organized by the village mayor." There was also a strong belief that the government should hold stakes and feel as responsible for vetiver's success as the villagers (that is, be involved beyond just providing seedlings).

A need for **supportive social norms and rules** was also noted, with existing examples of normative expectations highlighted by many respondents regarding other behaviours. For example, one respondent noted, "The normal rules that other villages have exist in this village too, like no grazing of animals by the riverbanks, no pollution in the river, etc. However, it is more to ensure good health and waste management. The rules were not designed to manage riverbanks." Yet another noted, "While the villagers know about these rules, there are always some that will not be governed by it." The fact that many farmers still grazed animals and littered near where the vetiver was planted on the riverbank seemed to dissuade many about whether the community could successfully plant and maintain vetiver. Results from the semi-structured surveys painted a similar story: nearly 93% of respondents surveyed thought that people in their community should plant vetiver grass along the riverbank to reduce erosion, yet only 59% of respondents believed others in their community expected them to do so. This represents a slight case of pluralistic ignorance, where a strong majority of individuals in a group privately hold a norm or belief but incorrectly assume that most others do not. This can lead to a situation where norms do not have as much impact since they are actually misperceived, and people do not conform to what could otherwise be a powerful driver of behaviour.[1]

Follow-up discussions with the local field team revealed there was often a lack of **local accountability** in these villages since the wider Fijian government had removed some of the power of villages to impose sanctions on their members for breaking village rules.

Finally, it became apparent that **equity in participation** across groups would be critical to the success of interventions on vetiver and may have contributed to the limited success of past efforts. Some women mentioned that they had "heard about [vetiver] before that from other neighbouring villages when we have functions. Heard about how it helps hold the soil and control erosion. It sounds like a good thing to plant in our village, but the [former] Ministry of Waterway only brought a few, which they distributed to the men." Men had seemingly been told about vetiver, while women, for whom the riverbank holds specific importance, were

[1] Pluralistic ignorance has also been documented in western contexts in relation to climate mitigation (see for example, Sparkman et al., 2022).

asked to prepare food for the groups: "Men and a woman did the planting while the women's group organized the catering for those involved in the planting." As one participant noted, how can vetiver be successful "without any prior training or awareness that included women so they can know the benefits if any of planting it?"

Self-Efficacy

In contrast to outcome efficacy and choice uncertainty, which pertained more to confidence about the choice and outcomes of using vetiver grass, self-efficacy referred to individuals' confidence in their ability to plant and maintain vetiver grass successfully. **Confidence in skills** was a common issue raised by many respondents, who felt they lacked the necessary skills and techniques to plant and maintain vetiver effectively. They expressed a need for more security in the procedures and techniques required to both keep the plant alive and ensure it maximally reduces erosion.[2]

Past efforts were often described as insufficient in providing the necessary information on how to plant and maintain vetiver. One respondent shared, "[The Ministry of Waterways] people, without prior notice, distributed vetiver planting materials with barely minimal instructions on planting the plant." Another echoed this sentiment, stating, "It was a one-off and ad hoc/unplanned planting by some 20 village men. Ministry of Waterway people, without prior notice, distributed vetiver planting materials with barely minimal instructions on planting the plant."

The unease was particularly evident when discussing vetiver patches that had been washed away. One respondent noted, "It would help if a lot is planted. Not the way it was done," while another suggested that the vetiver's failure was "maybe due to the spacing of the plants." Overall, it was clear that villagers were uncertain why previous attempts had not succeeded and whether this was due to issues with planting and maintenance or other factors.

This uncertainty also seemed related to a lack of access to knowledge. Some respondents stated that after the initial training, they received no further assistance from those who had initially provided the vetiver. They also did not receive tools or decision aids that could have **eased vetiver planting and maintenance behaviours**. This is particularly relevant as—vetiver being a new behaviour—implementers are fighting against villagers' status quo bias, i.e., our tendency to prefer familiar choices (even ones that lead to greater losses) over change. This is especially true when new practices seem complex or challenging and pose a common challenge to many climate-adaptive behaviours. Reducing the effort and perceived risk associated with planting and maintaining vetiver (sometimes at the expense of other practices) could go a long way in encouraging adoption.

[2] Using appropriate planting specifications and designs (e.g., bank slope, spacing of the plants) and maintenance techniques (e.g., trimming, tillering) are crucial for success, particularly for new vetiver plants (Vanoh, 2020).

4.0 Lessons on Applying Behavioural Science for Climate Adaptation

We analyzed a past government-led EbA intervention and found that it was undertaken without prior research on behaviour and did not work.

The past government intervention to support vetiver grass adoption failed to effectively address the key drivers of behaviour. Our data reveals that government actions mostly targeted two drivers: "material access" by providing free planting materials to the communities and "self-efficacy" (in particular, ease of behaviour) by providing rudimentary training to some villagers to plant vetiver grass.

However, these two drivers were not addressed effectively. For example, to avoid burdening the communities, the support was provided as a rapid, one-off intervention instead of an ongoing support over a certain period. Men and youth perceived that the awareness-raising session was insufficient to build their skills and confidence in planting and maintaining vetiver grass effectively. As mentioned in the previous section, women were mobilized to prepare food during the government intervention and were not included in the awareness-raising session. It led to a lack of awareness on vetiver grass among women despite being key custodians of the riverbanks.

Furthermore, the government left unaddressed four other important drivers of behaviour: salience of loss, outcome efficacy, self-efficacy, and choice uncertainty. For example, local knowledge about the environment and the conditions required for vetiver grass to be effective in reducing riverbank erosion was ignored, which likely contributed to the erosion and destruction of the young vetiver plants in some places and decreased confidence in vetiver as an effective erosion control measure. The issue of untapped local knowledge in project design and implementation is a recurrent theme in the literature on key barriers preventing the adoption of EbA solutions at scale in the Pacific region (e.g., Nalau et al., 2018; Youngs et al., 2022).

Our research found that the drivers likely to enable (or prevent) vetiver grass adoption for riverbank rehabilitation in selected communities in Fiji are complex but identifiable.

Many factors likely influence decision making around vetiver grass adoption at the household and community levels. Our analysis reveals that six main drivers influenced the adoption (or non-adoption) of vetiver grass for riverbank erosion control against flooding in the four communities: salience of loss, choice uncertainty, outcome efficacy, collective efficacy, self-efficacy, and material access. Together, these drivers and their constituent 19 variables work in concert to push and pull decision-makers toward or away from adopting and maintaining vetiver grass.

For example, under perceived "collective efficacy," our qualitative data indicated that the local accountability mechanism related to vetiver grass planting and maintenance along riverbanks was an important consideration for villagers. More potential for accountability (or less) is then

likely to lead to more (or less) adoption among villagers. Similarly, the existence of supportive social norms around vetiver grass would make it more likely for villagers to adopt it, whereas the existence of norms critical of vetiver would impede adoption. Each village likely exhibits different magnitudes and signs for these factors, and further quantitative research would permit future interventions to refine their focus on those variables that were lacking or actively pushing against vetiver adoption.

Addressing the key drivers of behaviour identified for using vetiver grass requires interventions different than what had been done in the past.

A singular intervention is unlikely to address all variables driving decision making at the household and community levels. Behavioural science research shows that a combination of interventions addressing multiple drivers is often required to drive and sustain collective action (Bujold & Thulin, 2021; Rare & the Behavioural Insights Team, 2019). This means that while each of the 19 variables identified is important to support vetiver grass adoption, addressing each variable in a siloed manner will likely not be sufficient to bring sustained change. The Fijian government and development partners need to craft different interventions each aimed at addressing different drivers of vetiver grass adoption. In doing so, they can test individual interventions to see what kind of change they bring about in the variables they hope to change and then see how that change affects behaviour itself. It is, therefore, also important to understand where the target communities are starting from regarding those variables that are important for driving behaviour change.

Future work could help prioritize which variables to target, especially when resources are limited.

Further research is needed in the selected communities to identify which combination of variables should be prioritized for future interventions aimed at encouraging vetiver grass adoption. Because the data collected for this project is mainly qualitative, our analysis does not reveal the prevalence or magnitude of each driver in these Fijian villages. In other words, we do not know the "status" of each variable. For example, we do not know if perceived "collective efficacy," which comprises five variables, ranks high or low among the entire community (and for which communities and whom within these communities, which age and gender groups), and how this result compares with the other drivers.

Next steps require quantifying where these communities stand with regard to the drivers identified to understand the need for specific interventions. The quantitative scoring of the drivers of vetiver grass adoption could be done by delivering a new quantitative household survey covering the 19 variables identified. It would be interesting to compare the results with the meta-analyses of studies, largely conducted in the Global North, done by van Valkengoed and Steg (2019). They found that negative affect (a negative emotional response to a climate hazard), self-efficacy, outcome efficacy, and descriptive norms (people's perception of what behaviour is commonly done by others) may be more effective at driving climate adaptation behaviour than some other, yet most researched, factors including experience with, and knowledge of, climate hazards and climate change, place attachment (having a strong emotional connection to a particular location), and trust in government and in measures implemented by government.

Finally, additional research could also be done to understand how the different variables influence each other to accelerate the adoption of vetiver grass in the selected sites.

Despite being highly localized, our findings are generally aligned with the existing literature on key factors influencing the adoption of climate adaptation solutions at the individual and community levels.

Various studies have explored the factors that influence the adoption of climate adaptation solutions at the individual and community levels (Chemonics International, 2019; IPCC, 2022). In addition, Anderson and Renaud (2021) conducted a meta-analysis of existing studies, largely focused on Europe, describing nature-based solutions or grey measures for hazard risk reduction. They also identified similar factors influencing public acceptance.

Importantly, the extent to which each factor supports or inhibits the adoption of climate adaptation solutions is likely very (place and time) context specific, based on the combination of factors present in the community at the start of an intervention. For example, place attachment has been reported to reduce climate risk perceptions or to increase people's exposure to climate risks in some places, while in other places, it was reported to increase community climate resilience (IPCC, 2022). Given the lack of data on the role of the drivers of climate adaptation behaviour in the Global South, further research is needed to understand potential similarities and differences across cultures and geographies.

Our study sheds light on two challenges to overcome to advance the application of behavioural science in climate adaptation.

First, applying behavioural science is fairly resource intensive. Understanding current behaviour and what determines behaviour often requires collecting and analyzing multiple rounds of primary data at the household and community levels. However, this approach is likely a lot less costly than having an intervention not work. This case study shows that failure to properly engage with communities in understanding and testing the factors that influence their climate adaptation behaviour can backfire. In fact, the data collection process of 2023 conducted as part of this study served as an intervention, providing information about vetiver to those not previously reached. When the three field experts went back to the selected communities in February 2024, 1 year after the initial data collection, they observed that the environment seemed to have become more supportive of vetiver grass adoption. Discussions with villagers indicated that their awareness about vetiver (choice uncertainty) had increased. Many villagers who had not been reached by the past government intervention participated in the study's focus groups and surveys, where they heard a lot more about vetiver than they otherwise would have. Some villagers reported having started to collect vetiver grass seeds from neighbouring villages as a result. This illustrates the importance and benefits of investing time and resources in community engagement early in project design.

Second, it is important to look at the adoption of EbA solutions within the broader context of climate adaptation and development. Indeed, the focus on vetiver adoption at the local level should not overlook the broader and more systemic issues that are causing riverbank erosion. Vetiver planting does not address the root causes of riverbank erosion and flooding in these locations, which are likely driven by unsustainable development such as deforestation, poor road drainage systems, and gravel extraction from the riverbed. Climate change is exacerbating the negative impacts of these factors on communities that are dependent on riverine ecosystems for their livelihoods. Related to this, solely focusing on changing behaviour at the household and community levels is not enough to effectively address climate adaptation. Our understanding of adaptation behaviour at the individual and community level must be completed with an analysis of behavioural system change (Diaz Del Valle et al., 2024). This is to acknowledge that other actors beyond communities are directly and indirectly involved in riverbank erosion. Such analysis can help demonstrate how to coordinate change in behaviour among different actors across scales and identify the most strategic change intervention points in the system.

5.0 Conclusion

The application of behavioural science to the design, implementation, and monitoring and evaluation of climate adaptation initiatives at the local level is still underutilized. The use of behavioural science to improve the adoption of EbA solutions may be even more relevant compared with other climate adaptation solutions, considering their inherent complexity. Indeed, EbA solutions require a deep understanding of communities' needs and priorities to ensure that solutions address the negative impacts of climate variability and change while also supporting biodiversity conservation and community well-being in terms of economic, socio-cultural, and spiritual needs.

This case study illustrates how behavioural science helps to question and reframe our assumptions about people's decision making and to design or diagnose interventions that are grounded in greater understanding of the psychological, social, and structural drivers of human actions.

The key drivers of behaviour are not new to the climate adaptation community, which includes practitioners already working across a range of disciplines from social sciences such as human geography, anthropology, and sociology. The different frameworks available to map the drivers of behaviour, such as the one used in the context of this analysis, are useful to ensure that a range of factors is systematically considered. Importantly, despite all the research focused on identifying the drivers of behaviour, few attempts have been made to design interventions to effectively address the drivers of behaviour.

Improving the application of behavioural science into climate adaptation initiatives calls for establishing new partnerships between climate adaptation experts and behavioural scientists. Behavioural scientists are already engaging in many fruitful areas of collaboration, such as on financial, public health, and food choice decision making. Our analysis highlights how important and urgent it is for climate adaptation professionals to also engage with behavioural scientists early, at the start of project formulation, to ensure that climate adaptation initiatives are informed by a deep understanding of human behaviour.

Such collaboration can help governments and development partners approach climate adaptation interventions differently: the starting point of the analysis shifts from understanding what people need to do in relation to a specific climate adaptation issue to understanding what people are doing (their actual behaviour) and why they do what they do. This requires "real" community engagement and actively listening to the communities, their needs, and priorities. This approach can be at odds with how "behavioural change" is typically perceived as an external approach used to impose change on people.

Beyond improving project design and implementation, more research is needed to assess the effectiveness of interventions aimed at addressing the drivers of climate adaptation behaviour (Valkengoed & Steg, 2019). For example, while various EbA pilots have been conducted globally, including in the Pacific region, there are limited assessments of the level of adoption, their effectiveness in delivering benefits to communities, as well as the barriers to adoption (IPCC, 2022). Government and development partners, therefore, need to prioritize the monitoring and evaluation of these interventions. They need to be clearer on what the actual and expected behaviours are in relation to the issue of focus to be able to assess whether behaviour change efforts in climate adaptation are effective.

References

Anderson C., & Renaud, F. (2021). A review of public acceptance of nature-based solutions: The "why," "when," and "how" of success for disaster risk reduction measures. *Ambio, 50,* 1552–1573. https://link.springer.com/article/10.1007/s13280-021-01502-4

Bujold, P., & Thulin, E. (2021). Complex behavioral challenges require multi-faceted behavioral solutions: Driving change in sustainable agriculture. In A. Samson (Ed.), *Behavioral economics guide 2021* (pp. 122–131). https://www.behavioraleconomics.com/be-guide/

Chemonics International. (2019). *Applying social and behavior change to climate change adaptation.* A literature review. United States Agency for International Development. https://www.climatelinks.org/sites/default/files/asset/document/2020_USAID_ATLAS_SBC-for-CCA-Literature-Review.pdf

Commonwealth Scientific and Industrial Research Organisation & Secretariat of the Pacific Regional Environment Programme. (2021). *"NextGen" projections for the Western Tropical Pacific: Current and future climate for Fiji. Final report to the Australia-Pacific Climate Partnership for the Next Generation Climate Projections for the Western Tropical Pacific project* (CSIRO Technical Report). https://www.met.gov.fj/aifs_prods/Climate_Products/Country%20Report%20Fiji.pdf

Dean, M., Kibris, O., & Masatlioglu, Y. (2017). Limited attention and status quo bias. *Journal of Economic Theory, 169,* 93–127. https://www.sciencedirect.com/science/article/abs/pii/S0022053117300170

Diaz Del Valle, E., Jang, C., & Wendel, S. (2024). *Behavioral systems: combining behavioral science and systems analysis.* Busara. https://www.busara.global/wp-content/uploads/2024/02/Diaz-Del-Valle_Jang_Wendel_BehavioralSystems_Groundwork_2024.pdf

Government of the Republic of Fiji. (2017). *Climate vulnerability assessment. Making Fiji climate resilient.* World Bank. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/163081509454340771/climate-vulnerability-assessment-making-fiji-climate-resilient

Government of the Republic of Fiji. (2018). *National adaptation plan. A pathway toward climate resilience.* Republic of Fiji. https://www4.unfccc.int/sites/NAPC/Documents/Parties/National%20Adaptation%20Plan_Fiji.pdf

Institute of Pacific Islands Forestry. (2018). *Pacific island ecosystems at risk (PIER): Plant threats to Pacific ecosystems.* http://www.hear.org/pier/

Intergovernmental Panel on Climate Change. (2022). *Climate change 2022: Impacts, adaptation and vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama [Eds.]). Cambridge University Press.

Nalau, J., Becken, S., Schliephack, J., Parsons, M, Brown, C., & Mackey, B. (2018). The role of Indigenous and Traditional Knowledge in ecosystem-based adaptation: A review of the literature and case studies from the Pacific Islands. *Weather, Climate, and Society, 10*(4), 851–865. https://journals.ametsoc.org/view/journals/wcas/10/4/wcas-d-18-0032_1.xml

Petit, V. (2019). *The behavioural drivers model: A conceptual framework for social and behaviour change programming.* UNICEF.

Rare & the Behavioural Insights Team. (2019). *Behavior change for nature: A behavioral science toolkit for practitioners.*

Sparkman, G., Geiger, N., & Weber E. U. (2022). Americans experience a false social reality by underestimating popular climate policy support by nearly half. *Nature Communications, 13.* Article 4779. https://www.nature.com/articles/s41467-022-32412-y

Truong, P., & Creighton, C. (1994). *Report on the potential weed problem of vetiver grass and its effectiveness in soil erosion control in Fiji. Report on a study tour of Fiji between 4 and 11 June 1994.* https://vetiver.org/FIJ_ER1994.pdf

van Valkengoed, A. M., & Steg, L. (2019). *Meta-analyses of factors motivating climate change adaptation behaviour. Nature Climate Change, 9,* 158–163.

Vanoh, R. (2020). *Training on the use of vetiver grass against soil erosion. Training report.* Fiji Ministry of Waterways and Environment. https://info.undp.org/docs/pdc/Documents/FJI/Vetiver%20Training%20Report%202020.pdf

Williamson, K., Bujold, P. M., & Thulin, E. (2020). *Behavior change interventions in practice: A synthesis of criteria, approaches, case studies & indicators.* Rare Center for Behavior & the Environment and the Scientific and Technical Advisory Panel to the Global Environment Facility. https://behavior.rare.org/wp-content/uploads/2021/02/Behavior-Change-Interventions-in-Practice-final.pdf

Youngs, K., Johnson, J., & Basel, B. (2022). *Review of nature-based solutions in the Pacific region: focus and opportunities* (Report prepared for WWF Australia). https://assets.wwf.org.au/image/upload/f_pdf/2022_MCC_WWF_Review_of_NbS_in_the_Pacific?_a=ATO2Ba20

Appendix A. Factors Influencing the Adoption of Vetiver Grass for Riverbank Erosion Control Against Flooding in Selected Communities in Fiji

Main drivers of behaviour (and what it means for villagers)	**Key variables**	**Explanation**
Salience of loss: Whether villagers feel strongly about the negative impacts that erosion and flooding have on their lives	1. Experience with flood risk	Widespread recognition that riverine erosion and flooding are more frequent and intense
	2. Emotional salience of flooding	People associate strong negative emotions with the impact that riverine erosion and flooding have on their lives and those of others.
	3. Attachment to place	Cultural identity closely linked to territorial domain, including the riverbank
Outcome efficacy: Whether villagers feel vetiver grass will successfully reduce erosion	4. Trust in government measures	Government blamed for not implementing a vetiver planting program effectively in the communities
	5. Past experience	Past attempts at planting and maintaining vetiver perceived as failures by some members in the community
	6. Social proof of success	Interest in observing nearby communities successfully engaged in planting and maintaining vetiver
	7. Integration of local knowledge	Untapped knowledge about the local environment and the conditions required for vetiver to be effective in reducing soil erosion
	8. Beliefs about the causes of riverine floods	Beliefs that riverbank erosion and flooding are mostly caused by development issues, such as gravel extraction, and that vetiver is not going to be effective on its own

Main drivers of behaviour (and what it means for villagers)	**Key variables**	**Explanation**
Choice uncertainty (option ambiguity): Whether villagers are (un) certain about the options available to them to reduce erosion	9. Trust in government	Government blamed for contributing to riverbank erosion
	10. Availability of relevant information about vetiver and alternatives	Perceived lack of information on vetiver and riverbank management and on available options for reducing riverbank erosion
	11. Perceived benefits of vetiver versus alternatives	Concern that allocating scarce arable land for vetiver is a missed opportunity to cultivate cash crops
Material access: Whether villagers feel they can easily access and afford vetiver	12. Resources and services accessibility	Limited availability and accessibility of planting material and of regular technical advisory services
Self-efficacy: Whether villagers feel they personally can successfully plant and maintain vetiver grass to reduce erosion	13. Ease of behaviour	Perceived lack of information and a decision tool on how to plant and maintain vetiver along the riverbank
	14. Confidence in skills	Perceived lack of skills (procedures and techniques) to plant and maintain vetiver successfully
Collective efficacy: Whether villagers feel their community has the capacity to plant and maintain vetiver to reduce erosion	15. Supportive local institutions	Vetiver (and riverbank management more broadly) not prioritized in existing local institutional arrangements
	16. Local accountability	Absence of local accountability mechanism related to vetiver
	17. Supportive social norms	Belief that other farmers will use vetiver and that they expect others to also use vetiver
	18. Sense of responsibility	Perceived shared responsibility between the community and the government for community protection
	19. Equity in participation	Women were not involved in past vetiver training as opposed to men and youth.

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