

| Research focus<br>Typology                               | A/R inputs                                                                                                                  | Outcome Metrics                                                                  | Impact<br>Direction | Recognition Justice |             |             |                   |                       |        |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Procedural Justice |                   |                       |        |             |             |             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Distribution of Justice |        |   |   |   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |
|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|---------------------|---------------------|-------------|-------------|-------------------|-----------------------|--------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-------------------|-----------------------|--------|-------------|-------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|--------|---|---|---|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|                                                          |                                                                                                                             |                                                                                  |                     | Individuals         | Communities | Generations | Social<br>Systems | Non-human<br>entities | Nature | Individuals | Communities                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Generations        | Social<br>Systems | Non-human<br>entities | Nature | Individuals | Communities | Generations | Social<br>Systems                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Non-human<br>entities   | Nature |   |   |   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |
| assessment of A/R techniques                             | plantations and commercial forestry                                                                                         | spatial suitability of tree species used for A/R                                 | positive            | 🟢                   | 🟢           | 🟢           | 🟢                 | 🔴                     | 🔴      | 🔴           | best outcomes<br>* Individuals and communities may benefit from carbon trading and forest creation opportunities.<br>* Nature as an entity benefits as a result of more focus on forests and forestry given carbon trading.<br><br>Urgent outcomes<br>* Non-human entities and nature might suffer as a result of monoculture plantations                                                                                                                                                                                                                                                                                                    | 🟢                  | 🟢                 | 🟢                     | 🟢      | 🔴           | 🔴           | 🔴           | best outcomes<br>* Individuals and communities (as social systems) are benefiting to offset the A/R implementation process of carbon forestry.<br>* Given the spatial suitability of tree species to be planted in a certain, nature is also considered a vital part of the process of A/R implementation<br><br>Urgent outcomes<br>* Monoculture and plantation forestry will limit the benefits aimed to nature as an entity                                                                                                                                                                                                                                                                         | 🟢                       | 🟢      | 🟢 | 🟢 | 🔴 | 🔴 | best outcomes<br>* Individuals benefit as a result of successful carbon trading for their nature as an entity.<br>* Building new infrastructure through carbon forestry projects and new generations are accounted for by reducing net emissions in the natural resources                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
|                                                          | carbon trading and commercial forestry                                                                                      | spatial suitability of tree species used for A/R                                 | negative            | 🟢                   | 🟢           | 🟢           | 🟢                 | 🔴                     | 🔴      | 🔴           | best outcomes<br>* Individuals may benefit from carbon trading forestry as this creates employment opportunities.<br>* Nature as an entity benefits as a result of more focus on forests and forestry given carbon trading.<br><br>Urgent outcomes<br>* Non-optimal suitability of tree species chosen for A/R will create issues for the local natural resources.                                                                                                                                                                                                                                                                           | 🟢                  | 🟢                 | 🟢                     | 🟢      | 🔴           | 🔴           | 🔴           | best outcomes<br>* Individuals and communities benefit as a result of successful carbon trading by offsetting their emissions.<br>* A/R has benefits for nature as an entity as it leads to an increase in the natural resources<br><br>Urgent outcomes<br>* Non-optimal suitability of trees may create problems of tree mortality and reduced sustainability of forestation programs                                                                                                                                                                                                                                                                                                                 |                         |        |   |   |   |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |
| assessment of institutional mechanisms                   | private land/forest management, expansion of private differentiation permits                                                | supply and management of private differentiation permits                         | positive            | 🟢                   | 🟢           | 🟢           | 🟢                 | 🔴                     | 🔴      | 🔴           | best outcomes<br>* A regulatory system (as a social system) is set up as a recognition of the need for proper management of natural resources like forests which gives recognition to nature and non-human entities.<br>* Could be an issue about recognizing implications of management, especially for other parts of nature                                                                                                                                                                                                                                                                                                               | 🟢                  | 🟢                 | 🟢                     | 🟢      | 🔴           | 🔴           | 🔴           | best outcomes<br>* Social systems are made more efficient in order to generate benefits.<br>* Nature and non-human animals receive better participation through their part in plantation activities.<br><br>Urgent outcomes<br>* Individual and communities of local owners and private entrepreneurs get represented in the regulatory process well. They also receive technical advice for forest maintenance                                                                                                                                                                                                                                                                                        | 🟢                       | 🟢      | 🟢 | 🟢 | 🔴 | 🔴 | best outcomes<br>* Individuals are also forced to work on forested land and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |
|                                                          | A/R initiatives (agro-forestry)                                                                                             | financial viability of agroforestry                                              | positive            | 🟢                   | 🟢           | 🟢           | 🟢                 | 🔴                     | 🔴      | 🔴           | best outcomes<br>* Financial recognition of individuals and market based agro-industries (as social systems) possible as a result of agro-forestry.<br><br>Urgent outcomes<br>* Financial focus of A/R intervention does not recognize the intrinsic value of nature and non-human entities. May also create unequal recognition patterns for individuals and communities                                                                                                                                                                                                                                                                    | 🟢                  | 🟢                 | 🟢                     | 🟢      | 🔴           | 🔴           | 🔴           | best outcomes<br>* Procedural recognition will be given to communities to increase viability of agro-forestry<br>* Farmers, non-human entities may improve the quality of nature<br><br>Urgent outcomes<br>* Urgent outcomes for nature could come from a marginal focus on a particular species                                                                                                                                                                                                                                                                                                                                                                                                       | 🟢                       | 🟢      | 🟢 | 🟢 | 🔴 | 🔴 | best outcomes<br>* Individuals are possible for individuals, communities, non-human entities and nature given there is proper management and distribution of financial benefits<br><br>Urgent outcomes<br>* Urgent outcomes for all are possible given the improper management and distribution of financial benefits received from agro forestry                                                                                                                                                                                                                                                                                                                                                      |  |
| cost-effectiveness and optimization                      | carbon trading and commercial forestry                                                                                      | cost-effectiveness of plantation                                                 | negative            | 🟢                   | 🟢           | 🟢           | 🟢                 | 🔴                     | 🔴      | 🔴           | best outcomes<br>* Financial recognition of individuals possible as a result of commercial forestry.<br><br>Urgent outcomes<br>* Financial focus of A/R intervention does not recognize the intrinsic value of nature and non-human entities. Plantation is opposed to nature and regeneration does not recognize nature and non-humans.<br>* May also create unequal recognition patterns for individuals and communities                                                                                                                                                                                                                   | 🟢                  | 🟢                 | 🟢                     | 🟢      | 🔴           | 🔴           | 🔴           | best outcomes<br>* The direction of outcomes is specialized as a result of limited information available<br><br>Urgent outcomes<br>* Individuals are possible for individuals, communities, non-human entities and nature given there is proper management and distribution of financial benefits<br><br>Urgent outcomes<br>* Urgent outcomes are possible as a result of a natural system being transformed to a highly specialized one                                                                                                                                                                                                                                                               | 🟢                       | 🟢      | 🟢 | 🟢 | 🔴 | 🔴 | best outcomes<br>* Individuals are possible for individuals, communities, non-human entities and nature given there is proper management and distribution of financial benefits<br><br>Urgent outcomes<br>* Urgent outcomes are possible as a result of a natural system being transformed to a highly specialized one                                                                                                                                                                                                                                                                                                                                                                                 |  |
|                                                          | protected areas expansion, rural exodus and developmental initiatives and other A/R initiatives                             | diversity of micro-organisms, micro-organisms, microbes                          | positive            | 🔴                   | 🔴           | 🔴           | 🔴                 | 🔴                     | 🔴      | 🔴           | best outcomes<br>* Nature, non-human: benefits on habitats and all species in protected areas and offsetting agricultural lands (under intrinsic values, but instrumental values (i.e., protect for human purposes)<br><br>Urgent outcomes<br>* Individuals and local communities may have been treated in decisions related to the implementation of A/R activities, affecting their needs and interests<br>* Social systems: conservation priorities (expansion of protected areas) may restrict rural economy and non-economic development, potentially driven by unequal institutional participation                                     | 🔴                  | 🔴                 | 🔴                     | 🔴      | 🔴           | 🔴           | 🔴           | best outcomes<br>* Nature, non-human entities and individuals are protected in the expansion of protected areas, although it may have better environmental conditions (e.g., in soil)<br>* Individuals, human communities, non-human, higher carbon storage (i.e., less carbon in the atmosphere)<br>* Non-human benefits for microorganisms, tree species, etc.<br><br>Urgent outcomes<br>* Generations: higher carbon storage, which could be released in the future<br>* Human communities and individuals around protected and disturbed areas would be more affected than others<br>* Non-human individuals and communities around agricultural infrastructure would be more affected than others | 🔴                       | 🔴      | 🔴 | 🔴 | 🔴 | 🔴 | best outcomes<br>* Nature, non-human entities and individuals are protected in the expansion of protected areas, although it may have better environmental conditions (e.g., in soil)<br>* Individuals, human communities, non-human, higher carbon storage (i.e., less carbon in the atmosphere)<br>* Non-human benefits for microorganisms, tree species, etc.<br><br>Urgent outcomes<br>* Generations: higher carbon storage, which could be released in the future<br>* Human communities and individuals around protected and disturbed areas would be more affected than others<br>* Non-human individuals and communities around agricultural infrastructure would be more affected than others |  |
| effect on biodiversity and other ecological consequences | plantations and monocultures                                                                                                | wooded diversity                                                                 | negative            | 🟢                   | 🟢           | 🟢           | 🟢                 | 🔴                     | 🔴      | 🔴           | best outcomes<br>* Human individuals and communities (recognized): human-centred A/R interventions<br><br>Urgent outcomes<br>* Nature and non-human (not recognized): production activities have an impact because they may not be aligned with the ecological needs (use of nature or native species)                                                                                                                                                                                                                                                                                                                                       | 🟢                  | 🟢                 | 🟢                     | 🟢      | 🔴           | 🔴           | 🔴           | best outcomes<br>* Non-human and nature: whose voices seem to be considered in the decisions<br>* Social systems: only forestry sector considered (e.g., conservation/conservation initiatives apparently not included)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 🟢                       | 🟢      | 🟢 | 🟢 | 🔴 | 🔴 | Urgent outcomes<br>* Non-human/nature: different (potentially) of impact depending on the location of plantations and levels of microbial diversity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |
|                                                          | local participation in private land management                                                                              | longevity of planted trees: longevities                                          | positive            | 🟢                   | 🟢           | 🟢           | 🟢                 | 🔴                     | 🔴      | 🔴           | best outcomes<br>* Nature, non-human: implicitly recognized in reforestation initiatives and related activities that may have reversed the existing conditions that are negative for non-humans (e.g., mining)<br>* Communities: information considered cultural significance of selected tree species, meaning that the community interests were taken into account<br><br>Urgent outcomes<br>* Social systems, individuals, community mining activities were less affected (e.g., interrupted/reduced), affecting local jobs and the economic interests of some natural resources. As a whole, this could impact the role of the territory | 🟢                  | 🟢                 | 🟢                     | 🟢      | 🔴           | 🔴           | 🔴           | best outcomes<br>* Individuals, communities, non-humans, nature: grasses may have been planted enough, including the articulation of non-human voices through participation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 🟢                       | 🟢      | 🟢 | 🟢 | 🔴 | 🔴 | Urgent outcomes<br>* Generations (human and non-human): benefits of trees and mangroves, will grow<br>* Humans and non-humans: there may be original distribution of the (dis)benefits depending on the localization of reforested areas                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  |
| effect on growth and longevity                           | A/R initiatives (tree planting)                                                                                             | health and diversity of vegetation                                               | negative            | 🟢                   | 🟢           | 🟢           | 🟢                 | 🔴                     | 🔴      | 🔴           | best outcomes<br>* Nature, non-human: tree planting initiatives consider common local/native species (i.e., recognize the interests and needs of non-human subjects and their habitat)<br><br>Urgent outcomes<br>* Nature: existing land degradation apparently was not recognized before planting, which may have had the negative impacts                                                                                                                                                                                                                                                                                                  | 🟢                  | 🟢                 | 🟢                     | 🟢      | 🔴           | 🔴           | 🔴           | best outcomes<br>* Nature, non-human: interests and needs of non-human may have been articulated by farmers, even if there was an anthropocentric purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 🟢                       | 🟢      | 🟢 | 🟢 | 🔴 | 🔴 | Urgent outcomes<br>* Nature, non-human: communities, individuals, generations: localized tree plantations may bring unequal distribution of the (dis)benefits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |
|                                                          | rural exodus and developmental initiatives                                                                                  | existence of exodus                                                              | positive            | 🔴                   | 🔴           | 🔴           | 🔴                 | 🔴                     | 🔴      | 🔴           | best outcomes<br>* Some recognition requests could be experienced by individuals who previously used the land for other purposes, e.g., livestock grazing, and who identify suitability with such activities. This could have a broader effect on social systems, and communities.                                                                                                                                                                                                                                                                                                                                                           | 🟢                  | 🟢                 | 🟢                     | 🟢      | 🔴           | 🔴           | 🔴           | best outcomes<br>* Nature outcomes would largely be positive for the farmers' interests and provide a natural resource beyond protection.<br>* Non-human/nature would also benefit from habitat diversification.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 🟢                       | 🟢      | 🟢 | 🟢 | 🔴 | 🔴 | best outcomes<br>* Aesthetic control would benefit future generations as the trees mature and provide a growing evidence reforestation potential.<br>* They would also benefit from a more diverse habitat diversification.                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |
| effect on socio-economic conditions                      | A/R initiatives (forest adaptation), agricultural market reform                                                             | development of cultural identity, implementation of forest policies              | positive            | 🟢                   | 🟢           | 🟢           | 🟢                 | 🔴                     | 🔴      | 🔴           | best outcomes<br>* Recognition attributed to individuals and communities as land owners and decision-makers as well as to non-human and nature for better local adaptation of forest policies                                                                                                                                                                                                                                                                                                                                                                                                                                                | 🟢                  | 🟢                 | 🟢                     | 🟢      | 🔴           | 🔴           | 🔴           | best outcomes<br>* Agricultural identity which integrates social and natural systems is formalized as a result of proper management of natural resources and adaptation of forest policies to forest<br>* Institutional or more social regulatory systems benefits future generations                                                                                                                                                                                                                                                                                                                                                                                                                  | 🟢                       | 🟢      | 🟢 | 🟢 | 🔴 | 🔴 | best outcomes<br>* A cultural identity which integrates social and natural systems is formalized as a result of proper management of natural resources and adaptation of forest policies to forest<br>* Institutional or more social regulatory systems benefits future generations                                                                                                                                                                                                                                                                                                                                                                                                                    |  |
|                                                          | carbon trading and commercial forestry                                                                                      | eco-economic development, REDD+ program impacts                                  | negative            | 🟢                   | 🟢           | 🟢           | 🟢                 | 🔴                     | 🔴      | 🔴           | best outcomes<br>* Potential loss of livelihoods following a transition by reforestation tree planting (assuming that this is monocultural). Loss of landscape heterogeneity would also negatively affect non-humans and nature                                                                                                                                                                                                                                                                                                                                                                                                              | 🟢                  | 🟢                 | 🟢                     | 🟢      | 🔴           | 🔴           | 🔴           | best outcomes<br>* Individuals, communities and non-human, higher carbon storage (i.e., less carbon in the atmosphere)<br>* Non-human benefits for microorganisms, tree species, etc.<br><br>Urgent outcomes<br>* Carbon trading forestry will create benefits for nature as it leads to an increase in the natural resources<br>* Building new infrastructure through carbon forestry projects and new generations are accounted for by reducing net emissions in the natural resources                                                                                                                                                                                                               | 🟢                       | 🟢      | 🟢 | 🟢 | 🔴 | 🔴 | best outcomes<br>* Carbon trading forestry will create benefits for nature as it leads to an increase in the natural resources<br>* Building new infrastructure through carbon forestry projects and new generations are accounted for by reducing net emissions in the natural resources                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| effect on soil properties                                | A/R initiatives (forest restoration, wetland and degraded, wetland planting), private land management, forest market reform | soil carbon and nitrogen content, soil water content                             | positive            | 🟢                   | 🟢           | 🟢           | 🟢                 | 🔴                     | 🔴      | 🔴           | best outcomes<br>* Best outcomes for wetlands as ecosystems as they are recognized as having intrinsic value and thus should be protected and enhanced<br><br>Urgent outcomes<br>* Natural wetlands as mining may have caused land degradation losses causing urgent outcomes for nature and human communities dependent on that particular land                                                                                                                                                                                                                                                                                             | 🟢                  | 🟢                 | 🟢                     | 🟢      | 🔴           | 🔴           | 🔴           | best outcomes<br>* Mining wetland ecosystems will have impacts on local biodiversity and ecosystem stability<br>* Expansion of protected areas has implications on biodiversity of the region, and it remains untouched, beneficiaries of those will be an impact on ecosystem stability of that region, allowing to reduce environmental benefits to be lost<br><br>Urgent outcomes<br>* Mining wetlands as mining may have caused land degradation losses causing urgent outcomes for nature and human communities dependent on that particular land                                                                                                                                                 | 🟢                       | 🟢      | 🟢 | 🟢 | 🔴 | 🔴 | best outcomes<br>* Mining wetland ecosystems will have impacts on local biodiversity and ecosystem stability<br>* Expansion of protected areas has implications on biodiversity of the region, and it remains untouched, beneficiaries of those will be an impact on ecosystem stability of that region, allowing to reduce environmental benefits to be lost<br><br>Urgent outcomes<br>* Mining wetlands as mining may have caused land degradation losses causing urgent outcomes for nature and human communities dependent on that particular land                                                                                                                                                 |  |
|                                                          | A/R initiatives (wetland conservation)                                                                                      | soil water content                                                               | negative            | 🟢                   | 🟢           | 🟢           | 🟢                 | 🔴                     | 🔴      | 🔴           | best outcomes<br>* Positive impact on the soil water content in the region will have an impact on the biodiversity and other natural resources. Since there is no mention of any land use change, this will have an impact on the biodiversity and other natural resources.<br><br>Urgent outcomes<br>* Positive impact on the soil water content in the region will have an impact on the biodiversity and other natural resources. Since there is no mention of any land use change, this will have an impact on the biodiversity and other natural resources.                                                                             | 🟢                  | 🟢                 | 🟢                     | 🟢      | 🔴           | 🔴           | 🔴           | best outcomes<br>* Positive impact on the soil water content in the region will have an impact on the biodiversity and other natural resources. Since there is no mention of any land use change, this will have an impact on the biodiversity and other natural resources.<br><br>Urgent outcomes<br>* Positive impact on the soil water content in the region will have an impact on the biodiversity and other natural resources. Since there is no mention of any land use change, this will have an impact on the biodiversity and other natural resources.                                                                                                                                       | 🟢                       | 🟢      | 🟢 | 🟢 | 🔴 | 🔴 | best outcomes<br>* Positive impact on the soil water content in the region will have an impact on the biodiversity and other natural resources. Since there is no mention of any land use change, this will have an impact on the biodiversity and other natural resources.<br><br>Urgent outcomes<br>* Positive impact on the soil water content in the region will have an impact on the biodiversity and other natural resources. Since there is no mention of any land use change, this will have an impact on the biodiversity and other natural resources.                                                                                                                                       |  |
| effect on water cycle                                    | A/R initiatives (river management, private land management)                                                                 | actual water discharge and sediment load, water quality for livestock production | positive            | 🟢                   | 🟢           | 🟢           | 🟢                 | 🔴                     | 🔴      | 🔴           | best outcomes<br>* Positive impact on the soil water content in the region will have an impact on the biodiversity and other natural resources. Since there is no mention of any land use change, this will have an impact on the biodiversity and other natural resources.<br><br>Urgent outcomes<br>* Positive impact on the soil water content in the region will have an impact on the biodiversity and other natural resources. Since there is no mention of any land use change, this will have an impact on the biodiversity and other natural resources.                                                                             | 🟢                  | 🟢                 | 🟢                     | 🟢      | 🔴           | 🔴           | 🔴           | best outcomes<br>* Positive impact on the soil water content in the region will have an impact on the biodiversity and other natural resources. Since there is no mention of any land use change, this will have an impact on the biodiversity and other natural resources.<br><br>Urgent outcomes<br>* Positive impact on the soil water content in the region will have an impact on the biodiversity and other natural resources. Since there is no mention of any land use change, this will have an impact on the biodiversity and other natural resources.                                                                                                                                       | 🟢                       | 🟢      | 🟢 | 🟢 | 🔴 | 🔴 | best outcomes<br>* Positive impact on the soil water content in the region will have an impact on the biodiversity and other natural resources. Since there is no mention of any land use change, this will have an impact on the biodiversity and other natural resources.<br><br>Urgent outcomes<br>* Positive impact on the soil water content in the region will have an impact on the biodiversity and other natural resources. Since there is no mention of any land use change, this will have an impact on the biodiversity and other natural resources.                                                                                                                                       |  |
|                                                          | developmental initiatives, A/R initiatives                                                                                  | rate of ground water recharge                                                    | negative            | 🟢                   | 🟢           | 🟢           | 🟢                 | 🔴                     | 🔴      | 🔴           | best outcomes<br>* Development in the tourism industry through will involve an impact on individuals and the development of social systems around it.<br>* Nature might take a back seat, as it might be perceived and enhanced more as a protection of recreational activity                                                                                                                                                                                                                                                                                                                                                                | 🟢                  | 🟢                 | 🟢                     | 🟢      | 🔴           | 🔴           | 🔴           | best outcomes<br>* Development in the tourism industry through will involve an impact on individuals and the development of social systems around it.<br>* Nature might take a back seat, as it might be perceived and enhanced more as a protection of recreational activity                                                                                                                                                                                                                                                                                                                                                                                                                          | 🟢                       | 🟢      | 🟢 | 🟢 | 🔴 | 🔴 | best outcomes<br>* Development in the tourism industry through will involve an impact on individuals and the development of social systems around it.<br>* Nature might take a back seat, as it might be perceived and enhanced more as a protection of recreational activity                                                                                                                                                                                                                                                                                                                                                                                                                          |  |