RSB – ROUNDTABLE ON SUSTAINABLE BIOMATERIALS

RSB Water Impact Assessment Guidelines

Version 3.0
1 January 2018

RSB reference code: **RSB-GUI-01-009-01**

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Note on the use of this document

These guidelines help operators to conduct a water impact assessment by evaluating potential impacts of operations on water resources.

They describe key aspects to be investigated during planning of new projects or ongoing activities in order to identify potential impacts operations may have on water (including the use of invasive species) and good practices to minimise such impacts.

These guidelines should be used primarily by RSB participating operators who trigger a water impact assessment, as defined under Principle 9 of the RSB Principles & Criteria (RSB-STD-01-001). However, it is recommended that all RSB participating operators become acquainted with the issues described herein.

These guidelines may equally be used by the auditor and other actors involved in the verification of compliance in order to obtain a better understanding of key aspects to be considered during the certification process.

Under no circumstances should this document serve as the basis for verification of compliance or audits of operators. No aspect of this document is normative.

Contents

1. Introduction

As described in the RSB Impact Assessment Guideline (RSB-GUI-01-002-01), all participating operators will undertake a screening exercise to determine whether their potential impacts on water resources are sufficiently significant to trigger a water assessment. If this is the case, participating operators are invited to use these guidelines to identify, assess and mitigate their potential impacts to water resources, in line with the requirements of the RSB Standard.

In Version 3.0 of the RSB Principles & Criteria (RSB-STD-01-001), Principle 9 addresses water impacts as follows[1]:

- Criterion 9a: Identify and protect existing water rights, both formal and customary
- Criterion 9b: Design and implement a water management plan to minimise and monitor impacts
- Criterion 9c: Minimise water depletion
- Criterion 9d: Enhance or maintain the quality of water resources

Other relevant parts of the RSB Principles & Criteria for water aspects are Principle 1 (legality), Principle 2 (impact assessment), Principle 7 (conservation and ecosystem services) and Principle 11 (use of chemicals and waste management).

1.1 Managing corporate risk

Water is increasingly becoming an area of concern for businesses around the world. This stems from increasing competition for limited water supplies, deteriorating quality in many areas, and increasing concerns of local and global communities around the protection of water supplies and natural water systems.

It is therefore important for new and existing enterprises to manage all possible water risks in order to ensure that the business is sustainable. Water risks may be categorised in terms of physical, reputational, regulatory, or financial risks. The first two types of risks are of particular interest here. Physical water risks are those associated with a lack of availability of quality water due to, inter alia, water scarcity or poor water quality brought on by drought, competing water uses, infrastructure failure, or poor water management.

[1] Full text of Principle 9 available in Annex I

Reputational risk influences a business' social licence to operate. This has become an increasingly important concept for businesses in recent years. Essentially, social licence to operate is dependent on the support of local, regional, or global communities for a business to operate in a particular basin. The social licence to operate is not granted by legal or formal authorities, but rather through the consent of interested and affected communities. Such consent has to be achieved on several levels and has to be consistent with principles of corporate social responsibility.

In essence, even if a business is managing its water responsibly, if affected communities ***perceive*** the business to be impacting negatively on their water supplies, the quality of their water, or ecosystems on which they depend, the business may be at risk (see case study box[2]). To avoid this, businesses which are seen by the public as significant water users (in terms of extraction or pollution) should work with local communities to ensure the protection of water supplies and water-based ecosystems, and to establish the sustainability and legitimacy of their business.

Case Study: Coca Cola, India

In March 2004, local officials in Kerala, India shut down a major Coca-Cola bottling plant which had been blamed for a major decline in both the quantity and quality of water available to local villagers. Although it was later found that local wells continued to dry up after closure of the bottling plant, it was found that the plant had exacerbated the water scarcity situation. The plant had been located in a drought-stricken area; critics argued that that Coca-Cola did not involve the local community in its plans, and in hindsight, the plant should not have been located in that region to begin with.

1.2 Useful terms

Basin: See watershed

Critical Aquifer Recharge Area: Areas deemed necessary to provide adequate recharge and protection to aquifers. (Source: Washington State of Ecology). An aquifer recharge area is considered critical whenever there is a high risk that any operation occurring over this area systematically and irreversibly contaminates or depletes the aquifer.

Customary right: Water right conferred on the user through traditional or customary law or practice.

Evapotranspiration: Term used to describe the part of the water cycle which removes liquid water from an area with vegetation and transfers it into the atmosphere by the processes of both transpiration and evaporation. Evaporation occurs when liquid water is converted to water vapour and hence removed from a surface, such as a lake, soil or wet vegetation, into the air. Transpiration occurs when water in plant tissues is lost to the atmosphere, predominantly through small openings in the leaves of plants and grasses called stomata.

Formal right: Formal entitlement which confers on the holder the right to withdraw water.

Groundwater: All water that is below the surface of the ground in the saturation zone and in direct contact with the ground of the soil.

Surface water: All waters on the surface of the Earth found in rivers, streams, ponds, lakes, marshes, wetlands, ice and snow, and transitional, coastal and marine waters. (Source: GlobalGap).

Water allocation: Process in which an available water resource is distributed (or redistributed)

[2] See India Resource Centre (2003)

to legitimate claimants.

Water course: A discrete and significant element of surface water such as a lake, reservoir, a stream, river or canal, part of a stream, river or canal, transitional water or a stretch of coastal water. (Source: GlobalGap).

Water right: Right to take and use water subject to the terms and conditions of the grant. It is a formal or informal entitlement which confers on the holder the right to withdraw water.

Water-use right: Right conferred through an administrative process of water allocation, such as licensing, though in many situations there may be no formalised administrative allocation.

Watershed: The land area that drains water to a particular stream, river, or lake. It is a land feature that can be identified by tracing a line along the highest elevations between two areas on a map, often a ridge (Source: US Geological Survey). Synonymous with basin or catchment area.

2. Assessing water impacts

The general approach to the identification and assessment of impacts is detailed in the Impact Assessment Guideline (RSB-GUI-01-002-01). The following should be considered:

- The primary purpose of the screening exercise and scoping phase is to identify key issues and impacts to water resources within the specific context of the operation. These should inform the water assessment.
- It is important to seek input from local water users and other interested and affected parties (I&APs) who may have extensive knowledge on water rights, water uses and local baseline conditions.
- The operator and/or impact assessment practitioner should carefully evaluate the need to hire a water specialist to conduct the water assessment. If necessary to hire a specialist, the operator must ensure that the water specialist(s) is/are appropriately experienced and sufficiently knowledgeable about local conditions, the proposed development, and assessment techniques to provide an accurate and defendable assessment of the potential impacts to water resources.

2.1 Potential impacts to water associated with biofuel and biomaterial developments

An environmental impact is any change to the environment, whether adverse or beneficial, wholly or partially resulting from an operator's environmental issues or aspects. An environmental aspect is an element of an operator's activities, products or services that can interact with the environment (adapted from ISO 14.001).

There are a large number of potential impacts to surface and groundwater associated with biofuel and biomaterial developments. A list of key aspects and impacts to water resources is provided in Table 1. It should be noted that it is necessary to consider both the direct impacts associated with the operation as well as potential secondary/cumulative impacts. While the direct impacts may be of low significance, their significance might be elevated when considered in the broader context (for example, a series of projects within a single water course catchment area).

The table below should be used to assess potential impacts in all phases of project development, construction and operation.

Table1: Examples of potential impacts to water resources associated with biofuel or biomaterial developments.

Aspect	Impact	Phase
Land clearing and preparation	• Loss of aquatic habitat and biodiversity • Increased turbidity of water bodies due to erosion • Loss of access to rivers and wells on the estate for adjacent communities, including loss of traversing rights – both human and cattle • Decrease on stream flows and groundwater levels due to vegetation change (changes in evapotranspiration)	Construction and operation
Impoundment, installation of dams	• Change in volume of stream flow • Change in seasonality of the stream flow • Changes in flooding • Health risks associated with the creation of temporary habitat for vectors of disease including mosquitoes	Construction and operation
Irrigation and abstraction for process and non-process applications	• Alteration of natural flow of water course systems, including seasonality of stream flows • Loss of ecological functions, aquatic habitat and biodiversity • Competition with other water users • Loss of access to water for other users • Health risks associated with the creation of a temporary habitat for vectors of disease, including mosquitoes • Increased depth of the groundwater table • Sediment run-off (non-point source pollution)	Operation
Storage and application of fertilizers	• Eutrophication due to run-off or leaching • Reduced water quality • Increased salinity • Loss of aquatic biodiversity • Health impacts	Operation
Storage and application of pesticides	• Reduced water quality • Loss of aquatic biodiversity • Health impacts	Operation

Management and disposal of solid co-products and wastes	• Eutrophication due to run-off or leaching • Reduced water quality • Increased salinity • Loss of aquatic biodiversity • Health impacts • Contamination of water by leachate from solid waste storage areas, disposal sites or composting facilities • Contamination of storm water	Construction and operation
Management and disposal of liquid co-products and wastes	• Eutrophication due to run-off or leaching • Reduced water quality • Increased salinity • Loss of aquatic biodiversity • Health impacts • Contamination of water resources by untreated vinasse (stillage) • Contamination of storm water	Construction and operation
Construction and operation of infrastructure for the storage and transport of water (reservoirs, canals, etc.)	• Health risks associated with the creation of a temporary habitat for vectors of disease, including mosquitoes • Safety risks particularly for children	Construction and operation

2.2 What is unique about water impacts?

When assessing water impacts, some unique aspects should be considered:

- Water impacts can relate to both impacts on the project site as well as impacts far removed from the site. Impacts can be experienced by communities adjacent to the project and/or downstream from the project. Communities upstream of the project are unlikely to be impacted unless they are occasionally reliant on the downstream water resource (e.g. for seasonal watering of livestock).
- Water is often a limited resource. If water is limited, then one user having greater access tends to mean that other users have less access (see section on closed and open basins).
- Plants use water, and changing the crop cover can have water access impacts. This may be on surface and/or groundwater.
- The impacts may only be felt during some periods of the year. Low flow of rivers is often a critical issue.
- Water impacts may change between years, with drought years having impacts that might not have been experienced during normal years. Some users may only make use of specific water resources during drought years.
- Water impacts relate to quality, quantity and seasonality of access.
- The nature and severity of impacts will be situation dependent, though the biggest impacts may take place in water-stressed catchments in relatively arid areas. Both surface water and groundwater need to be considered.
- Tradeoffs sometimes need to be made between upstream and downstream water use.
- Water access varies greatly between different locations. In some instances, households have access to piped water at their homes, whilst in other situations community members

have to collect water from rivers, wells or communal boreholes.

- Once identified, negative impacts may be easily mitigated in many situations.
- Water impacts could have trans-boundary impacts, with impacts being felt far downstream in a different country.
- Groundwater and surface water are linked (see section below on groundwater/surface water interactions).
- Where water is being extracted for irrigation or other commercial uses (either by the operation or other water users) this will add complexity to the water allocation process.

2.3 Groundwater/surface water interactions

It is often assumed that groundwater and water in water course systems are two separate sources of water. An operator might, therefore, if a surface water allocation is not available, be tempted to look for an allocation of groundwater. In some allocation systems, an allocation of groundwater is more easily accessed by a land-owner than a surface water allocation.

However, in most cases, groundwater and surface water systems are interlinked, and abstraction of groundwater impacts on water course flow, particularly the extremely important base flow in dry seasons. The operator must, therefore, take this interaction into account when considering how to obtain a water allocation.

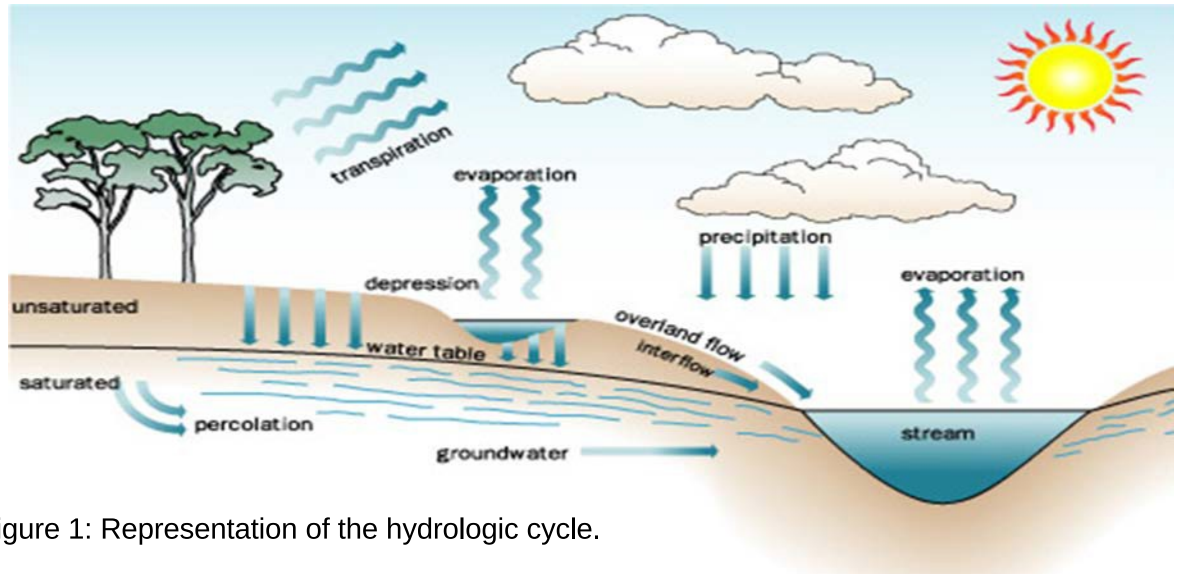


Figure 1: Representation of the hydrologic cycle.

This diagram describes the global hydrologic cycle which begins with the evaporation of water from the surfaces of streams and oceans. Warm moist air rises, then cools, eventually forming clouds. This moisture returns to the surface as precipitation, some of which evaporates back into the atmosphere or becomes part of surface and groundwater flow. Groundwater either seeps its way into rivers and oceans, or is released back into the atmosphere through transpiration. Surface runoff is carried back to the rivers and oceans, where the cycle commences again. It illustrates the linkages between groundwater and surface-water flow, and how upstream activities have a bearing on the volume and quality of water downstream.

2.4 Defining the catchment basin for assessing water impacts

In hydrological terms, a catchment has a very specific meaning, i.e. it is the area in which all water drains into the same river system. For the purposes of assessing water-related social impacts, it is only specific areas of the catchment that are of concern. Areas upstream of the operation are unlikely to be affected (though groundwater could be affected for a limited distance upstream); areas to the side of the project may be affected, especially in relation to groundwater impacts. It is streamflow and groundwater downstream of the project that is most likely to be impacted. The distance over which downstream impacts can perpetuate will be very situation-specific. In most instances, effects will be limited to a small sub-catchment, and once other streams merge with the stream from the operation's sub-catchment, impacts will be diluted. The distance downstream that needs to be investigated is the distance to which no further significant impacts are likely to be observed.

Impacts are most likely in water-stressed environments. In regions with high rainfall where there is no seasonal water stress, downstream impacts are unlikely. Equally, if the nature of the land-use change is unlikely to change the hydrological regime, then downstream impacts are unlikely. In both of these cases, the catchment of importance for the study can be limited to community members directly adjacent to the project.

Where irrigation is involved or where the crop is likely to transpire more water than the vegetation it replaces, or if any potential water pollution is contemplated, then the area of the catchment of concern will extend sideways and downstream from the project site. This is especially important in areas with seasonal water stress. In such situations, advice from a competent land-use hydrologist should be sought to determine the likely boundary of significant impacts.

Keep in mind that catchment impacts may only occur during the dry times of the year, or during drought years. The defined catchment must be based on likely impacts during these extreme conditions. The hydrological catchment may well be a different spatial area from social catchments used for assessing other social impacts such as food security.

Establishing baseline conditions

Before it is possible to assess the likely impacts of a proposed biofuel or biomaterial development on water resources, it is essential to obtain **reliable baseline information** i.e. a 'snap shot' of the current state of water resources and their use, prior to the development project within the vicinity of the study site. In addition to facilitating the identification and rating the significance of expected impacts, the baseline will also enable operators and stakeholders to determine whether the facility is likely to have an impact on water resources during the operational phase. The scope of the water assessment would depend on the nature of the water resources and drainage areas where the operation would extract, channel and redistribute water, as well as the nature of existing water resource data for the area. If the water to be used is limited to surface water, then it may not be necessary to undertake an assessment of groundwater sources.

Considering the **dynamic nature of water resources**, more specifically that their biophysical properties are highly variable both spatially and temporally, it is essential that the participating operator and water specialist(s) give careful consideration to the suite of parameters to be measured, the timing of sampling events, and the location of sample points. The choices made will depend to a large extent on the availability of existing data on rainfall and surface and groundwater quantity, quality and dynamics. Unfortunately, in most developing countries, there will be very little if any data available on groundwater resources and water course flows.

Information on the ecological and social reserves for the affected water course is needed in order to determine the quantity of water that could be used sustainably by new commercial developments. Under these circumstances, it will be necessary to collect primary data on water quantity and quality.

Due to the time and resource constraints associated with the impact assessment process, it may not be practical to gather primary baseline data for water resources over different seasons, as would be optimal. Under these limitations, it will be necessary to locate additional data from secondary sources, including academic publications, government reports, local residents and any other studies that have been conducted in the area of interest to estimate the seasonal variations.

Table 2 provides guidance on the type of parameters that need to be considered during baseline monitoring of water resources. Depending on the local context, certain of these parameters may be regarded as non-applicable, and further parameters may be added on the advice of the water specialist.

Table 2: Parameters to be considered for establishment of a baseline for water resources

Baseline grouping	Parameters
Nature of local water resources	• The location and physical description of surface and groundwater resources, including wells
Water use rights	• The nature of existing formal and customary water rights • The extent of water use by local communities • Current levels of access to water considering quantity, quality and seasonality for household use and farming
Water quantity	• How stressed is the basin? • Ecological reserve requirements • Seasonal flow regimes (water courses and streams) • Volumes abstracted from local water resources by other users
Water quality	• Nutrient concentration (chemical oxygen demand, biological oxygen total nitrogen, total phosphorus) • Total suspended solids (mg/L) • Total coliform bacteria (MPN/100mL) • Turbidity • pH • Salinity

3.1 What is your planned water use?

The first step in the appraisal process is to quantify what the operation's planned water use is likely to be. Different crops have different water requirements, and it is important to get a sense of the water use of the operation. Various tools exist that will enable a calculation of water use per type of crop per hectare. This is important in order to be able to assess the impact of the operations on water availability in the basin, and adjust water use to the result of the impact assessment.

3.2 How stressed is the basin?

One major step in the establishment of baseline conditions for water availability is to determine whether the basin considered for the project is stressed or not, that is, whether there is sufficient water available for the undertaking of the operations. The level of stress in a basin reflects the amount of water being used relative to the amount of water available for use (see Figure 1). The closer the volume used is to the available supply, the higher the level of stress.

- In an **unstressed basin**, where water is abundant, conflicts over water (and over water rights) are likely to be minimal, if not absent. There is likely to be sufficient water available for the biofuels or biomaterial operation. This, however, does not imply that existing rights, both formal and customary, should be ignored or that due process and consultation be disregarded.
- A **stressed basin** is defined as one in which the available freshwater supply, relative to water withdrawals, acts as a significant constraint to social or economic development. That is, water demand is getting close to the amount of water available in the basin. Water stress can also occur when the quality of freshwater deteriorates to the extent of restricting water use. While some jurisdictions formally declare stressed basins as such, it is important to note that not all cases of water scarcity will be formally recorded or recognised, particularly where water management institutions are weak or absent.
- A **closed basin** is one in which water demand has equalled, or exceeded the available water supply. Often, in this context, water is being used for economic purposes to the detriment of the environmental health of water resources, sometimes with the result that water courses dry up for part of their length, or in particular seasons. This does not constitute sustainable water use.

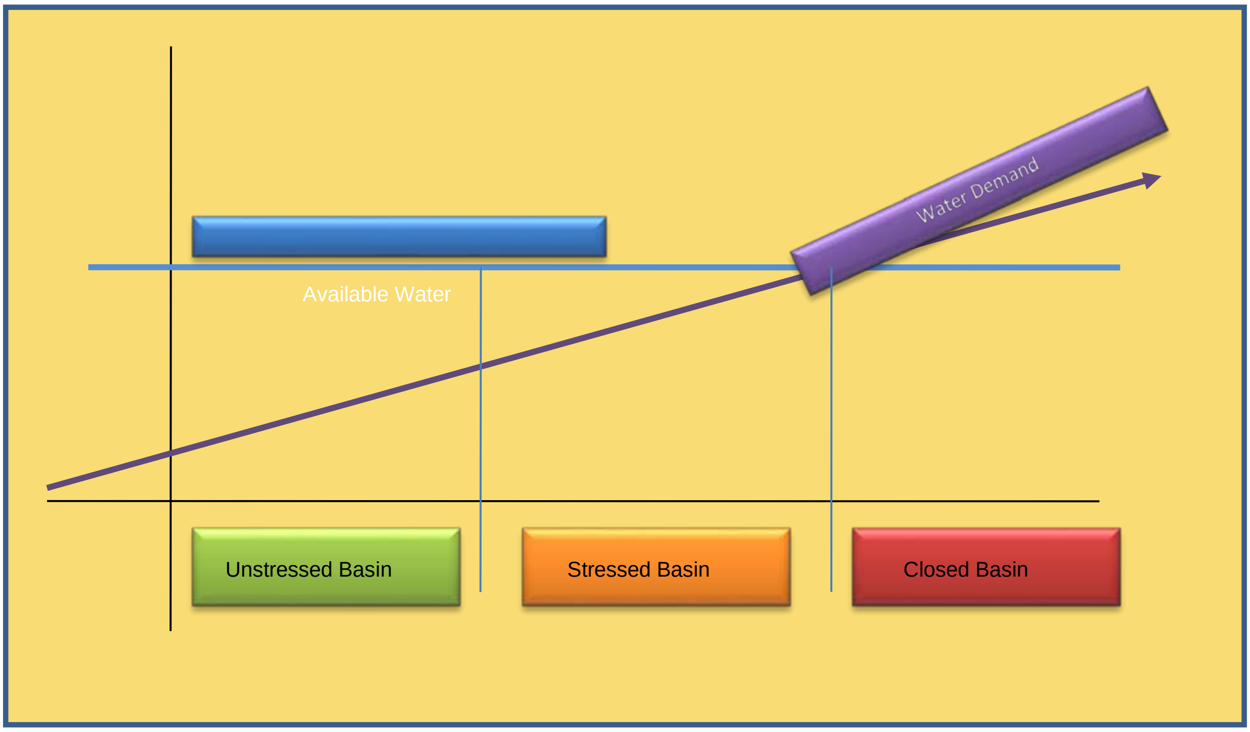


Figure 2: The relationship between available water and water demand in unstressed, stressed and closed basins

A question of scale
A basin can be defined at various degrees of scale, starting from the entire basin of a particular water course system, down to smaller sub-basins, and sub-sub-basins. An entire water course basin may be huge, like the Amazon or Congo water course basins, or may be quite small, as are some of the coastal water courses. While a basin may appear stressed, or unstressed, at one scale, differences in this picture may become visible at a different scale. Thus, within a stressed basin, it is possible to have sub-basins that still have water available, and vice versa. The assessor will need to look closely at this issue to determine local availability of water within a large basin.

To determine stress levels in the basin, the assessor should consult with the relevant government authority, which may be a department dealing with water resources allocation, or an agency such as a water course basin organisation. If insufficient information is available from the relevant authority, the assessor should consult available literature on the basin, and consult key stakeholders in the basin.

As has been described above, three options exist in terms of levels of water stress:

- **The basin is closed.** In this case, all available water has been allocated and all available water development options have been exhausted. In such a case, only the options of buying a water allocation or bringing in a water allocation from another basin exist as possibilities for finding water for the venture.
- **The basin is stressed, but not yet closed.** There are two possible scenarios in this case, with different implications for the operation. In the first scenario, environmental flows have already been met in the basin. In the second scenario, environmental flows have not yet been met. The second scenario poses significant risks to the operation as water may be taken away from allocations at some stage to meet environmental requirements.
- The third scenario – the basin is open - is where **there is ample water available** in the basin.

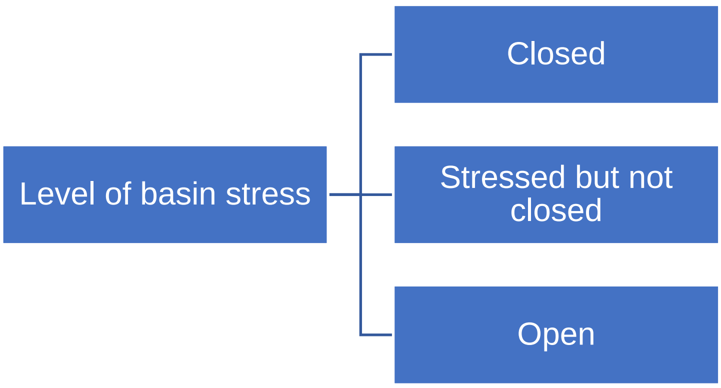


Figure 3: Identifying the level of water stress in the basin

3. Identifying and protecting water rights, and human and ecosystem needs

This section describes how to identify and protect water rights (Criterion 9a), human needs and ecosystem needs (Criterion 9c).

It considers several important aspects of operations:

- Whether water is available in the basin for the operation
- How to obtain water ethically where it is in short supply
- The identification and protection of formal and customary rights
- Water-related risks to the developer under certain conditions

During the development and implementation of a project, it is essential that the farmers, producers and processors ensure that they determine what water rights exist and that they develop strategies that respect such rights. This can be complex, and can involve technical assessments as well as work beyond the direct locality of the project area, due to the watershed aspects of the work. It may require that negotiated agreements are made with affected communities. Such agreements must be transparent and inclusive, and use processes consistent with free, prior and informed consent (FPIC).

3.1 Defining water rights

A water right is a formal or informal entitlement which confers on the holder the right to withdraw water. The process of water allocation generates a series of water rights which govern water use within a basin, and can be best described as the distribution of water resources to legitimate claimants through the granting, transfer, review and adaptation of water rights. Water rights are formalised through a number of different tools, in different places. These include licences, concessions, permits, access entitlements, or allocations.

Water rights are often thought of as only being those rights governed by formal laws, usually supported by a document issued by the government. However, customary water rights are also important to consider. Customary rights are explained below.

3.2 Customary water rights

Common or customary water rights are related to the communal use of water, where typically some form of community or user group will have set rights to allocate water to some degree. In most cases of customary water law, the private ownership of water is not recognised, and water is recognised as property of the community.

Traditional and customary water rights systems can be very sophisticated and well enforced. At the same time, because customary water rights are often not recorded officially, they can be difficult to account for and, without due consultation, are often overlooked in decision-making. It is important to note, however, that while laws in some countries are still to address the matter of customary rights, others have recently written aspects of customary law and rights into their statues. In many cases, customary and formal systems exist side by side. These may be overlaid with religious rules regarding water, and international obligations. These overlapping types of water rights may be of 'variable strength' - for example, customary law may be very strong, with state law unknown or irrelevant in remote communities. Conversely, in a mixed community with high migration rates, customary law may be much weaker than state law.

In establishing a new operation, it is extremely important to ensure that the development does not impact negatively on customary water rights.

➔ Because these rights are usually not recorded, and because they are often the rights of marginalised and poor communities, they are hard to define and easy to overlook, and particular care must be taken by the ethical developer to protect and support such rights.

3.3 Water for basic human needs

A further challenge is to ensure that the planned or existing project does not impact on the right of access to water for domestic and subsistence needs, particularly for poor, rural communities. This can occur in two ways. The first is the over-abstraction from a water course, particularly in dry seasons, leaving little or no flow for communities downstream that may be dependent on the water course for subsistence water needs.

The second relates to the use of groundwater. An industrial operator is likely to have more resources for the sinking of deeper boreholes than local communities. If the water table is lowered by abstraction, the operator will have the ability to sink a deeper borehole, thus lowering the water table beyond the reach of the shallower boreholes of the communities. This is a critical issue that must be managed if the operation is not to impact on domestic water supplies of rural communities.

These domestic and subsistence uses may be protected by customary or formal law, or may not have any particular protection in law. Nonetheless, it is important that they are respected and supported by the developer or operator.

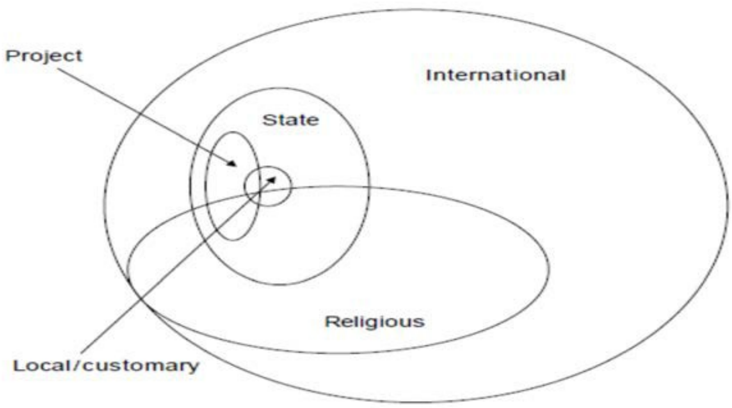


Figure 4: Relationships among different levels of water rights (Source: Meinzen-Dick and Nkonya. 2005)

This graphic shows that water rights are not only defined in the context of the prevailing state rules or local customs. There may also be overlap with other rules related to religious principles and international law. International river basins may have bilateral and multilateral treaties and conventions governing the management and allocation of the transboundary waters. Broader international treaties, such as the Ramsar Convention (The Convention on Wetlands of International Importance, especially as waterfowl habitat), may also influence access to water rights. Also, it is not uncommon for a specific project or undertaking to develop its own unique set of rules. Therefore, it is important that any water impact assessor realises these overlaps and that each interface may have its own set of prescriptions regarding how water is allocated.

3.4 Water for environmental requirements

Although relatively few countries officially protect the water requirements for environmental or ecological functioning, this is an area of increasing focus throughout the world. The protection of environmental flows, as it is termed, is increasingly being recognised as a critical part of sustainable water resources management.

Environmental flows refer to the water purposefully left in or released into river systems in order to maintain or restore freshwater and estuarine ecosystems and the human livelihoods and well-being that depend on these ecosystems. Increasingly, governments and water management authorities are realising the importance of ensuring environmental flows through the management of infrastructure such as dams, or through reducing abstraction from the river system. (IUCN, 2003)

3.5 Replenishment capacity

This term refers to the capacity for water tables, courses and other tanks to be refilled by water inputs (rain, runoffs etc.). In a sustainable system, the amount of water withdrawn over a given period of time equals the water inputs over the same period. If the withdrawals exceed the inputs, the resources are depleted.

In a closed or stressed basin, operators must establish whether the replenishment capacity of the water resources to be used for operations is not exceeded over a given period of time (e.g. one year). Regular measures of the water level in a given water table or water course can be performed or consulted to assess whether the replenishment capacity is already exceeded, causing depletion. If the case, the operator is unlikely to achieve compliance with RSB Principle 9 if more water is withdrawn from this resource, and should hence look for another source of water or buy water rights from another user (see below).

If the replenishment capacity is not exceeded before the operations start, operators are required to consult with local communities and experts to establish the maximum amounts to be sustainably withdrawn from the water resource. This consultation should occur during the stakeholder consultation required under Principle 2 and described in the Impact Assessment Guidelines (RSB-GUI-01-002-01).

3.6 Instruments for water allocation

There are a number of different arrangements by which water may be allocated, which include:

- **Automatic entitlement:** this is recognised in some allocation processes in the form of an automatic minimum entitlement to water for basic social purposes, or the maintenance of minimum environmental requirements.
- **Administrative or bureaucratic allocation,** where the right to abstract water is given by an authority such as a state agency or a water user group.
- **Market allocation,** where water rights are reallocated (both formally and informally) on the basis of trade rather than by administrative allocation.
- **Systems linked to land tenure,** where water rights are linked to ownership of land and therefore transfer of the land through sale or inheritance implies transfer of the water right.
- **Communal or customary processes** based on traditional, non-state law or local customs.

Where there is no further water for allocation, formal and informal water markets provide a mechanism for the re-allocation of water. Because most informal water markets are not sanctioned by policy or law, this guideline makes the assumption that the markets referred to here are legally recognised. However, it is important to recognise that in many developing countries, the institutional frameworks are often weak which, combined with poorly defined land and water rights, results in market inefficiency. Also, water markets do not exist in all countries. Formal markets may take the form of open water markets, spot markets or markets controlled by administrative water trading. In the case of open water markets, water rights are traded without administrative control and interference. Spot markets on the other hand, are temporary arrangements in which the holder of the water right retains the right, but can trade use of the water on a temporary basis. Water markets may also be formally regulated through an administrative system. Administrative water trading usually seeks to define and regulate specific parameters such as pricing and spatial elements as well as regulating aspects which have a bearing on poor and marginalised communities' access to water.

While water trading provides a mechanism through which water can be re-allocated, there may be negative impacts that should be considered. Most significant of these is that poorer communities, in trading their water rights for short term benefits, may be vulnerable to the long-term loss of livelihoods based on the use of that water. This is a possibility that operators and impact assessment professionals need to pre-empt and address in their assessment of courses of action.

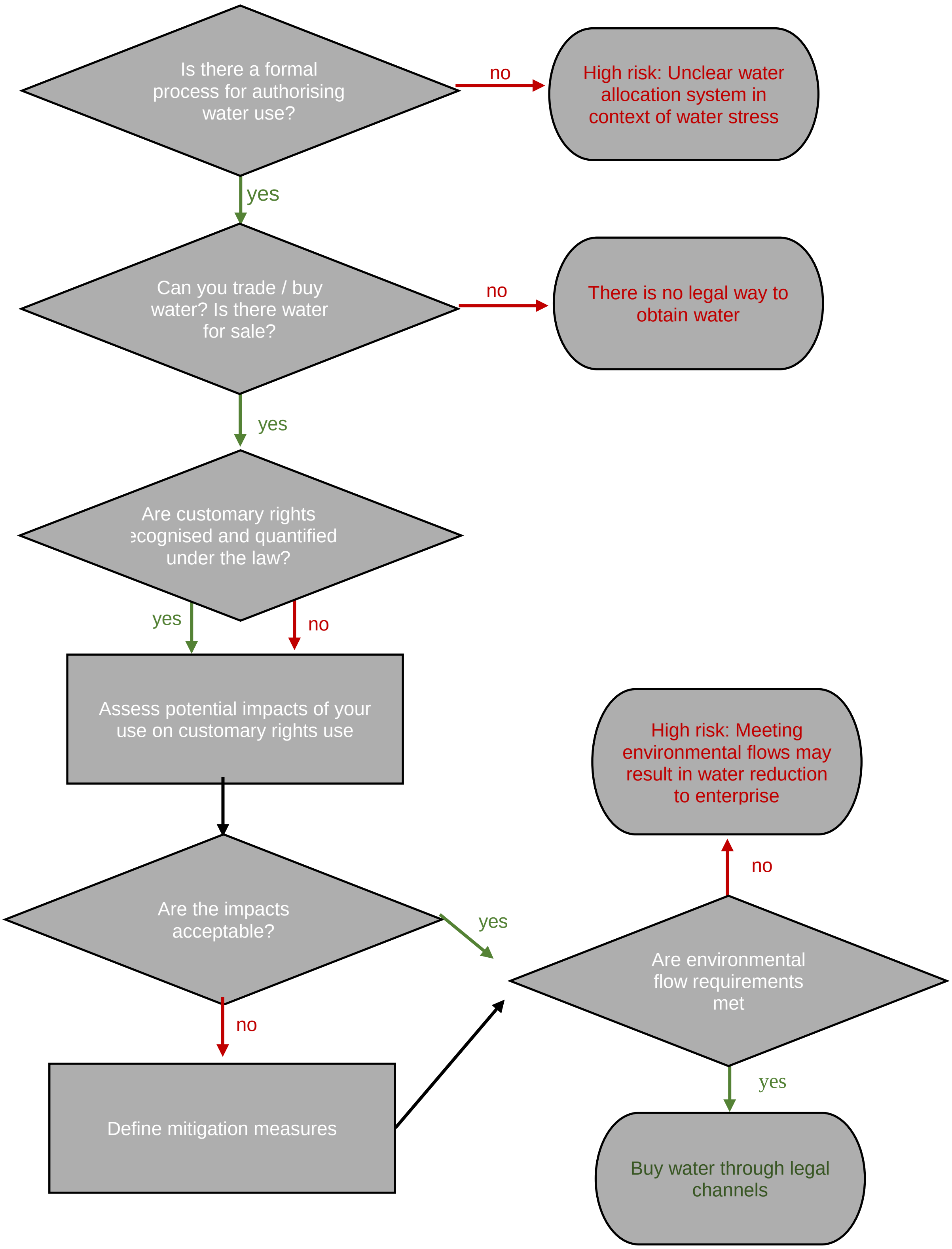
Equally, the sale of a water right on one part of a water course for use on another part of the water course may result in different impacts on other users or the ecosystem. The issue of where the rights are located is important in the trading of rights, particularly where trading is not controlled by the water authority.

3.7 Description of the process

Each of the scenarios described under "How stressed is the basin" in Section 4 is addressed below in terms of the implications for the project developer in ensuring the protection of formal and customary water rights, human needs and other ecosystem needs in the basin. Figure 5, Figure 6 and Figure 7 outline a series of questions that should be answered to ensure, in the context of each scenario, that water availability in the basin is maintained or enhanced. A number of these questions are the same in the context of the closed basin and the stressed basin.

The same iterative process is described in Annex II as checklists.

Figure 5: Flow chart of ethical water rights practice in a closed basin



In this scenario, there is no further water to allocate, and all feasible water development options have been exhausted. Competition for water is severe, there may be conflicts over water, and water shortages are likely to occur in years of low rainfall in particular.

There are two key questions that the operator must examine in such a basin:

i. Is there a **formal authorisation process** in place in the basin?
ii. Is **trading of water rights** possible in the basin?

If there is no formal authorisation process in place in the basin, the operator will place the operation at significant risk in terms of the competition for water and the difficulty of confirming water allocations for the development.

If the basin is closed, the only feasible way of obtaining water will be through buying a water allocation. If, therefore, trading is not allowed, there is no legal way to obtain water, and the operator should find a different location in which to operate.

If trading is allowed, the operator should **ascertain whether there is water for sale**. In basins where there is insufficient water but formal processes for obtaining water use exist, the subsequent course of action is then to examine market instruments as a means to re-allocate water to the operation. Where mechanisms for water trading exist and water rights are available for 'purchase', then it is possible for the operator to explore existing markets to secure the necessary allocations. In developed countries, such as Australia, there is a formal water market that is easy to access. Few basins in developing countries, however, have structured markets, and it is necessary to ask individual water users themselves if they have water that they wish to sell.

If there are no tradable water rights, or if mechanisms for trading rights do not exist and it is not possible to create additional storage for raw water, the basin cannot accommodate the development and either the scope of the operation must be re-assessed or other, more viable locations explored.

If there is water for sale, the operation should then consider the status of customary rights. The operator must **examine whether customary rights are recognised and protected in the basin**. The formal water law in some countries recognises customary rights, but in many countries the formal legal processes are either only beginning to consider customary rights or do not acknowledge them at all. It is possible that in some basins there may be some quantification of customary water use, which will allow the operator to understand the quantity and nature of these rights. However, this is likely to be the exception rather than the rule. Where such quantification does not exist, it is recommended that the operator consults with any communities that may have customary rights which may be impacted on by the operation.

If customary rights are present in the basin, whether they are protected and quantified under the law or not, the operator must consider the impacts of his water use on these rights. This may require the use of a professional to assess the impact, and will require engagement with the customary water users themselves.

If the impact is acceptable, the operator should then consider whether environmental flows have been met in the basin or not. If the impacts are not acceptable, the operator must consider whether there is any mitigatory action that can be taken to offset the impacts of the water use on customary rights.

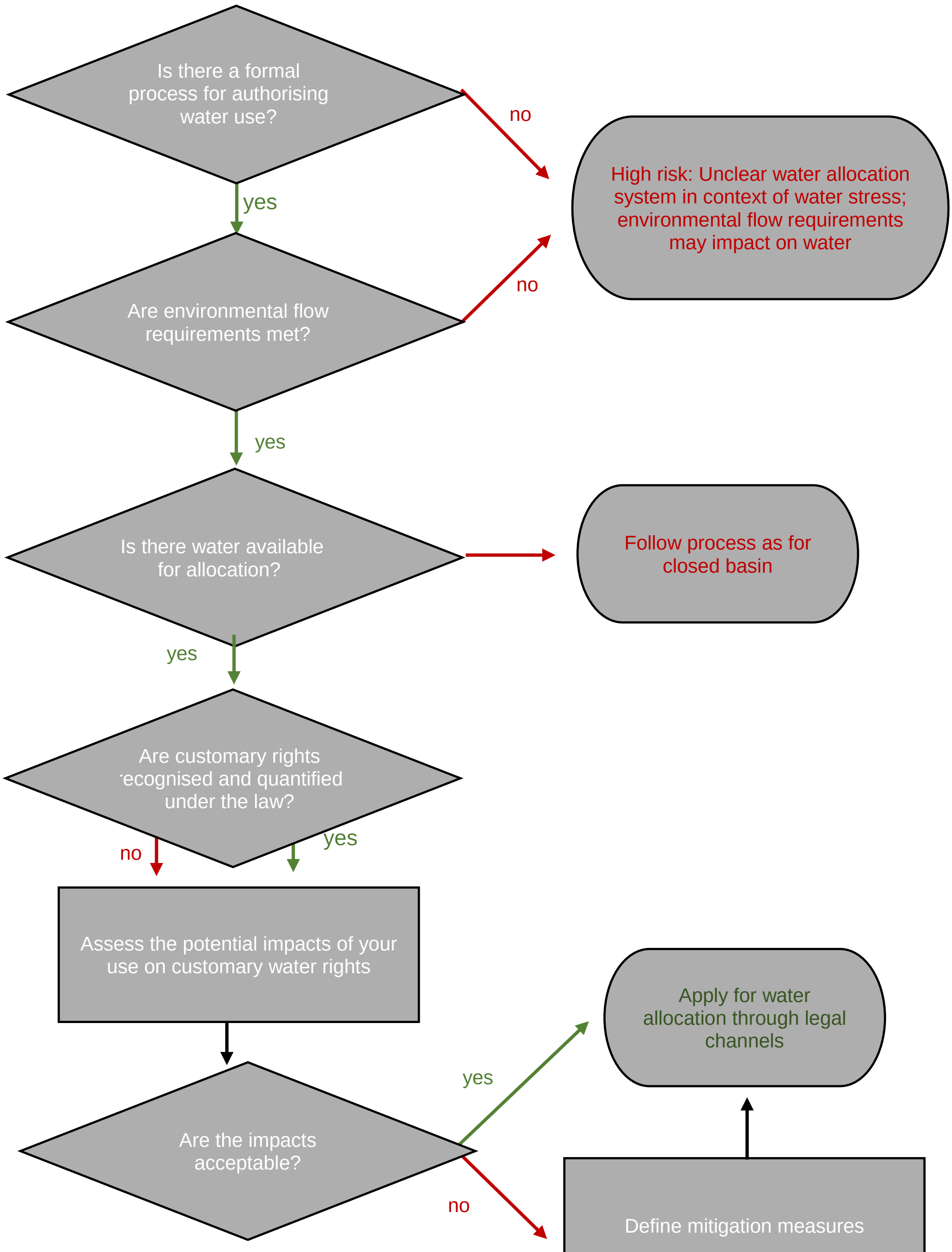
If mitigation is possible, the operator should then examine the issue of environmental flows. If mitigation is not possible, the operator should avoid development in this basin as the impacts will not be acceptable.

If there is water for sale in the basin, and if the operator is confident that the water use will not impact negatively on customary or domestic water use requirements in the basin, the operator should proceed to **buy water for the development**.

It is important in a closed basin to **understand whether environmental flows have been quantified and met** in the basin or not. If they have not, this poses a potential risk to the development in that future implementation of environmental flow requirements may result in the curtailment of water use by a range of users, including the operator.

Managing perception: in a closed basin there is also a serious issue of perception that must be managed. Where competition for water is high, a new entrant into the market may be seen as the cause of water shortages even if this is not actually the case. This may result in pressure to shut down the business (see Coca Cola case study). Operators should work closely with local communities to protect and even enhance community water rights and access to water, to avoid perception impacting negatively on the business.

Figure 6: Flow chart of ethical water rights practice in a stressed but not closed basin



As with a closed basin, the first question to be addressed in a stressed basin is **whether a formal process exists for authorisation** or recognition of water allocations. If the operation is in a stressed basin in which there is no formal process for authorising water use, this poses significant risk to the undertaking in that it may not be clear what competing allocations exist or are understood to exist in the basin, and it may be difficult to defend one's expected allocation against competition.

Secondly, it is important in a stressed basin to **understand whether environmental flows have been quantified and met** in the basin or not. If they have not, this poses a potential risk to the development, in that future implementation of environmental flow requirements may result in the curtailment of water use by a range of users, including the operator.

If there is a formal process of authorisation, the next step would be to check with the relevant authority if there is water available for allocation in the particular area of the operation.

At this point, the operator should also consider the issue of customary rights, by investigating whether they are recognised in law, and whether there is any kind of quantification or assessment of the customary rights. A high-level assessment of customary and domestic water use in the operation sub-basin should be conducted to understand the potential impact of the project on such uses. This may require the use of a professional to assess the impact, and will require engagement with the customary water users themselves.

If the impacts are acceptable, the operator can apply for water through the legal channels. If the impacts are not acceptable, the operation must consider whether there is any mitigatory action that can be taken to offset the impacts of the water use on customary rights.

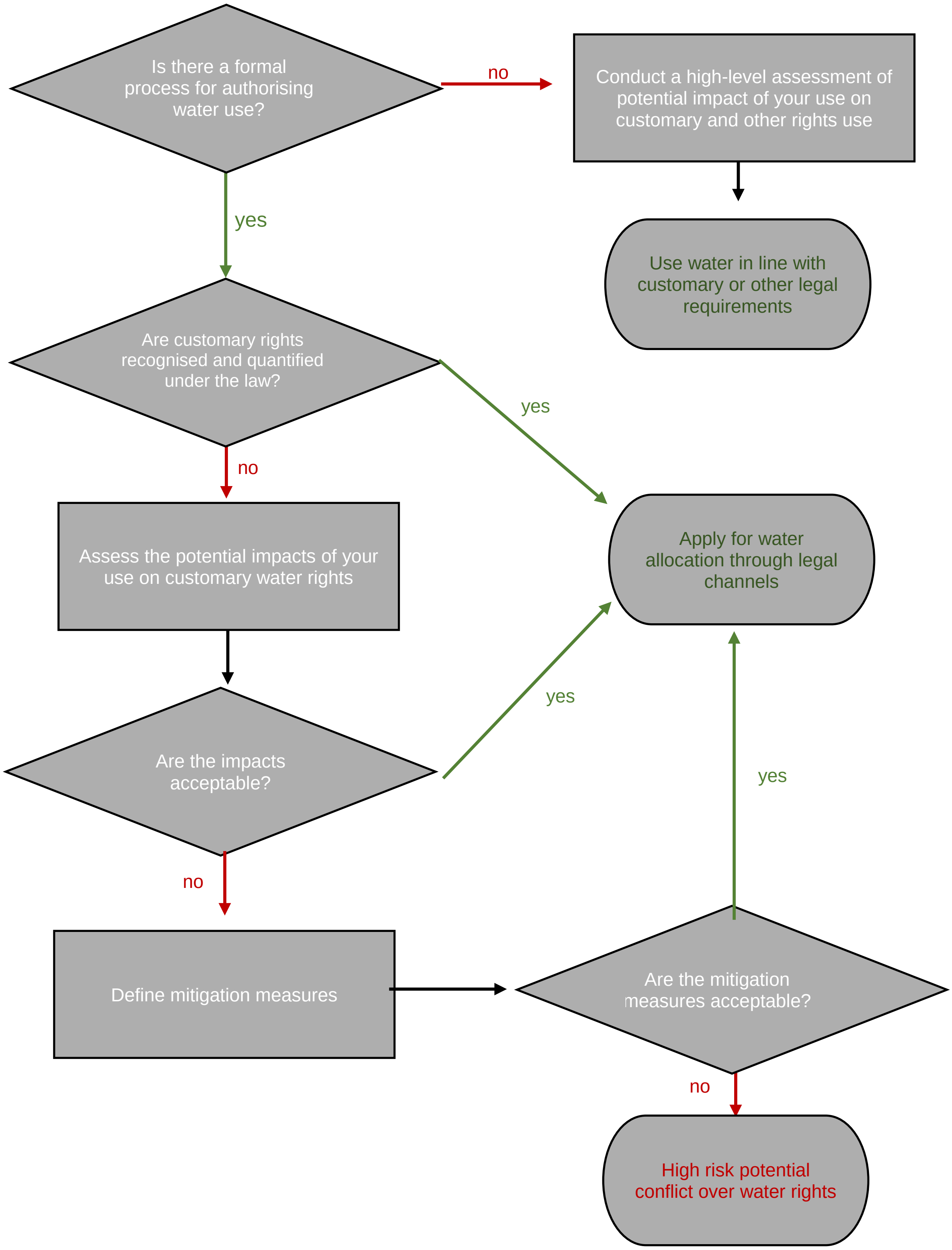
If mitigation is possible, the operator should apply for water through the normal channels. If mitigation is not possible, the operator should avoid development in this basin as the impacts will not be acceptable.

If there is water available, a formal authorisation system exists, and customary uses are taken into account in that assessment, the operator should apply for a water allocation from the appropriate authority.

If there is no water available, the operator should approach the matter as if the operation was operating in a closed basin, and look for water trading opportunities. One further opportunity exists in a stressed basin which does not exist in a closed basin – this is the possibility of constructing new storage infrastructure which will increase the yield of the basin. The potential of building a dam in order to create more water can be investigated and discussed with the relevant authorities. Dam construction often has its own set of authorisations that must be obtained, separate from a water-use authorisation. These may include an EIA, and a dam safety permit.

Managing perception: similarly to a closed basin, in a stressed basin there is also a real issue of perception that must be managed. Where competition for water is high, a new entrant into the market may be seen as the cause of water shortages even if this is not actually the case. This may result in pressure to shut down the business (see Coca Cola case study). Operators should work closely with local communities to protect and even enhance their access to water in order to avoid negative perceptions impacting on the business.

Figure 7: Flow chart of ethical water rights practice in an unstressed basin



Where the basin does not face water scarcity concerns and the basin is unstressed, the course of action for the operator is fairly simple. The first question to be addressed is whether there is **a formal process for authorisation of water allocations**. If not, the operator should conduct a high-level assessment of the impact of the operation's water use on existing water rights, including customary rights. This should include high-level stakeholder consultation according to the stakeholder guidelines. If the impact is acceptable, the operator should initiate the development, in accordance with prevailing customary and/or formal legislation.

If there is a formal process for authorisation of water allocations, such as the issuing of a licence or permit, the operator should **ascertain whether customary rights are recognised and protected** under this system. If they are, the operator should apply for a water allocation through the legal channels. If they are not, the developer should conduct a high-level assessment of the water use impact on customary rights, including consultation with relevant stakeholders and communities. If the impact is acceptable, the operator should apply for a water allocation through the formal legal process. If the impact is not acceptable, the operator should consider mitigatory measures. If these are acceptable, the operator can apply for water through the normal channels. If they are not acceptable, the operation should be avoided as there is a potential for conflict over water rights.

4. Additional information

4.1 Critical Aquifer Recharge Areas (9c and 9d)

The following guidance is taken from the Department of Ecology, Washington State (2007):

The goal of establishing Critical Aquifer Recharge Areas (CARAs) is to protect the functions and values of a community's drinking water by preventing pollution and maintaining supply.

CARAs can be defined as "areas with a critical recharging effect on aquifers used for potable water." The following steps characterise where groundwater resources are important to the community and how to protect them.

- *Identify where groundwater resources are located.*
- *Analyse the susceptibility of the natural setting where groundwater occurs.*
- *Inventory existing potential sources of groundwater contamination.*
- *Classify the relative vulnerability of groundwater to contamination events.*
- *Designate areas that are most at risk to contamination events.*
- *Protect by minimising activities and conditions that pose contamination risks.*
- *Ensure that contamination prevention plans and best management practices are followed.*
- *Manage groundwater withdrawals and recharge impacts to:*
    - *Maintain availability for drinking water sources.*
    - *Maintain stream base flow from groundwater to support in-stream flows, especially for salmon-bearing streams*

For more information, please consult the *Critical Aquifer Recharge Areas: Guidance Document* (Morgan, 2005).

4.2 Water quality

All participating operators are required to implement good practices that maintain or enhance the quality of the water resources used for the operations. Participating operators who trigger a water assessment during the screening exercise, are additionally required to evaluate and monitor the optimal water quality level required to sustain the system, taking into account local economic, climatic, hydrologic and ecologic conditions.

Water quality can be evaluated by measuring the following parameters:

- Nutrient concentration (chemical oxygen demand, biological oxygen demand, total nitrogen, total phosphorus)
- Total suspended solids (mg/L)
- Total coliform bacteria (MPN/100mL)
- Turbidity
- pH
- Salinity

Participating operators shall evaluate whether each of these parameters is at an optimal level under local conditions at the beginning of operations. It is recommended that this evaluation is conducted in consultation with water experts and the local community, for instance through the stakeholder consultation required under Principle 2 and described in the Impact Assessment Guidelines (RSB-GUI-01-002-01).

If water quality is deemed optimal at the beginning of the operations, participating operators are expected to implement practices that maintain the quality of water at the same level. If the evaluation reveals that some of these parameters and the water quality are sub-optimal, participating operators should implement practices that enhance the water quality. The capacity of the participating operator to achieve enhancement of water quality will be evaluated by the auditor, with regards to the local context and other users of the same water resource.

5. Mitigating and monitoring water impacts

6.1 Mitigation

It is not possible to anticipate the possible mitigation measures needed as these will depend on the nature and extent of the impacts, the local context and the practical constraints. The mitigation measures recommended for each impact need to be practical and effective in eliminating the impact, or reducing/increasing either the temporal or spatial scale of the impact, its severity or its likelihood of occurring. The impact rating table needs to indicate how the mitigation measure will change one or more of these rating factors. For negative impacts, the mitigation measures should reduce the significance levels, but for beneficial impacts the measures should enhance the benefits.

Water impacts can be easily mitigated in some situations. For instance, the plantation may be able to supply a borehole and pump (which they maintain) to compensate for a water source that is lost on the plantation. This may provide an opportunity for the company to show a positive contribution to the community development of the area. Understanding what water rights or access is being lost is a prerequisite for developing alternative mitigation strategies. These strategies do, however, require free, prior and informed consent. The developer must not simply assume that their mitigation will be acceptable to the community. This mitigation strategy must be captured in the Environmental and Social Management Plan (ESMP).

6.2 Monitoring

It is important that some form of monitoring be integrated into the ESMP of the project, both in terms of monitoring compliance and any residual impacts on the water resources environment. Monitoring is required to ensure good water resources management, as well as to ensure that any potential social impacts and conflicts are detected early on. Effective monitoring should provide information on aspects such as water quality and surface and groundwater patterns in order to establish seasonal variations and intra-annual variations. It is also good practice to involve not only the resource management authorities, but the local community as well.

Given that the impact assessment and ESMP will be used by auditors in the certification process, it is necessary for the impact assessment process to include a monitoring plan that will facilitate ongoing assessment of the impact of the operation. Consequently, the water expert needs to develop some recommendations with respect to what water indicators should be monitored, when, by whom and how. These recommendations should be sufficiently detailed to allow the responsible persons to be able to collect the data, analyse it and use it to assess project performance. Given the need to demonstrate compliance with RSB Principle 9, the indicators will need to cover all aspects of this principle and its criteria.

The following recommendations should be taken into consideration when developing monitoring proposals:

- Monitoring locations and frequency should be selected with the objective of providing representative water data for monitoring purposes;
- Parameters selected for monitoring should be indicative of the potential impacts or pollutants of concern from the proposed development, as well as the water quality and quantity requirements necessary to maintain ecological and human health;
- Parameters selected for monitoring should also include parameters that are regulated under compliance requirements;
- Monitoring programmes should apply internationally approved methods for sample collection, preservation and analysis;
- Analysis should be conducted by entities permitted or certified for this purpose;
- Sampling and analysis quality assurance / quality control plans should be prepared and implemented;
- In the case of biofuel or biomaterial developments, the monitoring programme should include effluents released to the environment to ensure that effluent quality meets the requirements of relevant legislation or, where applicable, IFC standards[3];
- The monitoring programme should also incorporate mechanisms to assess potential non-compliance or infringement on formal or customary water rights within the project area.

[3] See IFC (2007 a-c)

6. Structuring the water assessment report

Each of the specialist reports should follow that same structure and format. A suggested structure for the water report is as follows:

#	Section title	Contents
1	Summary	This should provide a summary of the specialist study, including the impacts, conclusions and recommendations.
2	Introduction	The introduction should provide brief background information, the terms of reference for the study, and the study team. It should include an overview of the legislative framework, including applicable international agreement and conventions, national acts, and sub-national laws and regulations, that is of relevance to the management and conservation of water. In addition, the relevance of specific legislation to the proposed project should be highlighted.
	Project description	An overview of the proposed development, including details of the agricultural, industrial and auxiliary components as well as the nature and extent of persons to be employed on the project, and any social development components. This should include a list of all aspects of the development requiring input water, together with the expected source of the water (surface water bodies, boreholes, etc.) and total volumes required. It should also include a list of all wastewater discharges from the proposed development including process effluent, wash water and sewage, as well as the quantity, quality and proposed disposal routes for these effluent streams.
3	Methodology	This section should indicate what data sources and research methods were used as well as the methods of data analysis. These methods should conform to internationally accepted methods.
4	Description of the social environment	This section should provide an in-depth description of the local social and natural environment within which the proposed project is to be located, with a focus on water resources (surface and sub-surface), climate, flood potential and key users of water resources within the broader study area. This should include a description of existing formal and customary water rights within the project area or which may be impacted negatively by the proposed development.

5	Impact assessment and mitigation measures	This section should form the bulk of the report. It should identify and discuss each of the individual impacts and use the impact ratings method to rate their significance before and after mitigation, as well as during the construction, operation and decommissioning phases of the project. For each impact, the recommended mitigation measures needed to reduce the negative impacts and enhance the positive impacts associated with the proposed development should be discussed. Attention should be drawn to any very high and irreversible impacts that cannot be mitigated, as these may be fatal flaws that prevent the project from going ahead, and detailed justification for such a significance rating will need to be provided.
6	Monitoring recommendations	This section should identify the key indicators that should be monitored over time and the methods that should be employed to monitor them.
7	Conclusion	This should provide a summary of the context and impacts.
8	Recommendation s	The recommendations should focus on the suggested mitigation measures.
9	References	A list of all the references and sources.
10	Appendices	These should include key sources of data/results that informed the study, data collection forms/questionnaires used, pictures and other lists or long tables that could not be included in the text of the report. This should include: • Any checklists, data sheets or questionnaires used during the baseline assessment • Details of analytical techniques and methodologies for preparation of samples • Any questionnaires used during the baseline assessment • Proof of certification for the analytical laboratory

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Annex I: RSB Principle 9 (Water)

Principle 9: Operations shall maintain or enhance the quality and quantity of surface and groundwater resources, and respect prior formal or customary water rights.

Criterion 9a: Operations shall respect the existing water rights of local and indigenous communities.

Operators who must comply: Biomass producers, industrial operators

Minimum requirements

- The use of water for operations shall not be at the expense of the water needed by the communities that rely on the same water source(s) for subsistence.

- The operator shall assess the potential impacts of the operations on water availability within the local community and ecosystems during the screening exercise of the impact assessment process, and mitigate any negative impacts.
- Water resources under legitimate dispute shall not be used for the operations until any legitimate disputes have been settled through negotiated agreements with affected stakeholders following a free, prior and informed consent (as described in 2a and its guidance) enabling process.

Where the screening exercise has triggered the need for a water assessment (RSB-GUI-01-009-01), operators shall:

- Identify downstream or groundwater users and determine the formal or customary water rights that exist;
- Evaluate and document the potential impacts of the operations on formal or customary water rights that exist;
- Respect and protect all formal or customary water rights that exist through the Environmental and Social Management Plan (ESMP) to prevent infringement of such rights. No modification of the existing rights can happen without the free, prior and informed consent (as described in 2a and its guidance) of the parties affected.

Criterion 9b: Operations shall include a water management plan which aims to use water efficiently, and maintain or enhance the quality of the water resources that are used for the operations.

Operators who must comply: Biomass producers, industrial operators

Minimum requirements

- Operators shall develop and implement a water management plan and integrate it into the Environmental and Social Management Plan (ESMP).
- The water management plan shall contain good water management practices to optimise water use, including:

    a. For rain-fed crops: practices that ensure that rain water is captured and used (e.g. use of cover crops, retaining crop stubble, etc.).

    b. For irrigated crops: practices that ensure good management of storage and delivery systems (e.g. application of water-saving irrigation techniques).

    c. The operator shall implement water-saving practices to increase the efficiency of the water use and reduce the amount of water used and/or wasted.

- The water management plan shall be made available to the public, unless limited by national law or international agreements on intellectual property.
- The water management plan shall be consistent with local rainfall conditions, not contradict any local or regional water management plans, and include the neighbouring areas, which receive direct runoff from the operational site. Any negative impact on these neighbouring areas shall be mitigated.
- The operator shall undertake annual monitoring of the effectiveness of the water management plan.

Criterion 9c: Operations shall not contribute to the depletion of surface or groundwater

resources beyond replenishment capacities.

Operators who must comply: Biomass producers, industrial operators

Minimum requirements

- Water used for the operations shall not be withdrawn beyond replenishment capacity of the water table, watercourse, or reservoir from which the water comes.
- Irrigated crops and freshwater-intensive operations systems shall not be established in long-term freshwater-stressed areas, unless there is the implementation of:
  - good practices, or
  - an adequate mitigation process that does not contradict other requirements in this standard, and ensures that the water level remains stable.
- Operators shall not withdraw water from natural watercourses to the extent that it modifies its natural course or the physical, chemical and biological equilibrium it had before the beginning of operations.
- Where the screening exercise has triggered the need for a water assessment (RSB-GUI-01-009-01), operators shall:
  - Identify critical aquifer recharge areas, replenishment capacities of local water tables, watercourses, and ecosystem needs. The potential impacts of operations on any of these aspects shall be evaluated, and any negative impacts mitigated.
  - Define the use and share of water resources for operations in agreement with local experts and the community; any water user committees shall be consulted.

Criterion 9d: Operations shall contribute to the enhancement or maintaining of the quality of the surface and groundwater resources.

Operators who must comply: Biomass producers, industrial operators

Minimum requirements

- Operations shall not occur on a critical aquifer recharge area without a specific authorisation from legal authorities.
- Operators shall implement the best available practices which aim to maintain or enhance the quality of surface and groundwater resources that are used for the operations, to the level deemed optimal for the local system for sustained water supply, ecosystem functioning and ecological services.
- Adequate precautions shall be taken to contain effluents, avoid runoffs and leaching and contamination of surface and groundwater resources, in particular from chemicals and biological agents.
- Buffer zones shall be set between the operation site and surface or groundwater resources.
- Where the screening exercise has triggered the need for a water assessment (RSB-GUI-01-009-01), participating operators shall determine the optimal water quality level required to sustain the system, taking into account local economic, climatic, hydrologic and ecologic conditions.

Progress requirements:

- For existing operations, degradation of water resources that occurred prior to certification and for which the participating operator is directly accountable shall be reversed. Wherever applicable, operators (except small-scale operators) shall participate in projects that aim to improve water quality at a watershed scale.

- Wastewater or runoff that contains potential organic and mineral contaminants shall be treated or recycled to prevent any negative impact on humans, wildlife, and natural compartments (water, soil).

Annex II: Checklists (water rights, human and ecosystem needs)

Checklist A: Scenario where basin is closed

A.1 Is the basin closed?	Yes	Proceed to A.2
	No	Proceed to B.1
A.2 Is there a formal process for authorising water use	Yes	Proceed to A.3
	No	Any proposed development will be at high risk due to uncertain water allocations in a context of high competition for water.
A.3 Can you buy or trade water?	Yes	Proceed to A.4
	No	There is no legal way to develop in this basin.
A.4 Is there water for sale?	Yes	Proceed to A.5
	No	There is no legal way to develop in this basin.
A.5 Are customary rights recognised and quantified under the law?	Yes	Proceed to A.6
	No	Proceed to A.6
A.6 Conduct assessment of impact of proposed water use on customary rights in the basin.	Acceptable	This may require the assistance of a professional in the water sector. It will require understanding who the customary water rights users are and engaging with them to understand their water rights and how any development in the basin may affect them. If acceptable, proceed to A.8.
	Not acceptable	If not acceptable proceed to A.7
A.7 Consider mitigating	Acceptable	Proceed to A.8
	Not acceptable	Developing in this basin will be high risk and likely to lead to conflict.
A.8 Buy water through legal channels		

Checklist B: Scenario where basin is stressed but not closed

B.1 Is the basin stressed?	Yes	Proceed to B.2
	No	Proceed to C.1
B.2 Is there a formal process for authorising water use?	Yes	Proceed to B.3
	No	This puts the project at high risk, since there may be conflict over unclear water rights in the basin.
B.3 Is there water available for reallocation?	Yes	Proceed to B.4
	No	Proceed to A.3

B.4 Are customary rights recognised and quantified under the law?	Yes	Proceed to B.5
	No	Proceed to B.7
B.5 Conduct assessment of impact of proposed water use on customary rights in the basin	Acceptable	This may require the assistance of a professional in the water sector. It will require understanding who the customary water rights users are and engaging with them to understand their water rights and how any development in the basin may affect them. If the impact is acceptable, proceed to B.7.
	Not acceptable	If the impact is not acceptable, consider mitigating factors
B.6 Mitigating factors	Acceptable	Proceed to B.7
	Not acceptable	This puts the project at high risk, since there may be conflict over water rights in the basin.
B.7 Apply for water allocation through legal channels.		

Checklist C: Scenario where basin is unstressed

C.1 Is the basin unstressed?	Yes	Proceed to C.2
	No	Proceed to B.1
C.2 Is there a formal process for authorising water use?	Yes	Proceed to C.3
	No	Proceed to C.5
C.3 Are customary rights recognised and quantified under the law?	Yes	Proceed to C.4
	No	Proceed to C.4
C.4 Conduct assessment of impact of proposed water use on customary rights in the basin	Acceptable	This may require the assistance of a professional in the water sector. It will require understanding who the customary water rights users are and engaging with them to understand their water rights and how any development in the basin may affect them. If the impact is acceptable, proceed to C.6.
	Not acceptable	Proceed to C.5
C.5 Consider mitigatory measures	Acceptable	Proceed to C.6
	Not acceptable	This puts the project at high risk, since there may be conflict over water rights in the basin.

C.6 Apply for water allocation through legal channels, or use water in line with customary or other legal requirements.		