RIVER BASIN REHABILITATION AND MANAGEMENT : BIODIVERSITY OFFSET IN SOUTH AFRICA

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ABSTRACT

The Environmental Authorisation for the Mooi Mgeni Transfer Scheme – Phase Two (37 m high dam, pump station and bulk water transfer pipeline) was issued in 2009. It contained a requirement to prepare Environmental Management Plans for biodiversity offsets and rehabilitation of off-site wetlands to compensate for the loss of habitat. Similar requirements were in the Environmental Authorisations for the Ingula Pumped Storage Scheme (39 m high upper dam, 41 m high lower dam, headrace tunnel and hydropower plant) and Mzimvubu Water Project (two large dams, tunnel and hydropower plant) in 2002 and 2015, respectively. This will be required in a new mega project as well, the uMkhomazi Water Project (81 m high dam and bulk water transfer tunnel and pipeline).

The above is fast becoming a requirement on new developments, including bulk water infrastructure projects. The mitigation of residual impacts on the ecosystems (forests, grasslands, tundra, and freshwater e.g. wetlands and rivers) are often misunderstood and/or underestimated. The conservation of the biodiversity in South Africa is mainly through rehabilitation and environmental management plans/programmes on the off-site areas, but within the affected river catchments. Interventions to improve the biodiversity and functional value of the ecosystems include amongst others, clearing of alien invasive plants, and implementation of erosion control measures. This is generally over a 30-year period.

This paper highlights some of the issues faced with the practicality of securing suitable offset sites, and the challenges with environmental management/implementation plans. In other words, what must be considered in the planning and implementation of bulk water infrastructure projects.

1. BACKGROUND

The Trans-Caledon Tunnel Authority (TCTA) is a State-owned entity that carries out *inter alia* the design and construction of bulk water infrastructure such as dams, pipelines and pump stations on behalf of the South African national Department of Water and Sanitation (DWS). In general, the construction of dams results in the inundation of large surface areas when the reservoir is at the Full Supply Level e.g. 1022 ha for the Spring Grove Dam in South Africa, which was completed by TCTA in 2013. Some of the residual negative impacts due to the construction and impoundment are as follows:

- Loss of habitat and endemic species, as well as species with high threat status;
- Loss of ecosystems – wetlands, grasslands, forests and river;
- Alteration of the river flow, and sediment and nutrient transportation downstream; and
- Some level of restriction on the movement of terrestrial species.

The consequences of the abovementioned impacts on dam basins and downstream of the same:

- The degradation of the freshwater quality (i.e. physical, chemical and biological);
- Soil erosion on the riparian environments and/or the riverbed;
- Host alien invasive species e.g. algae, predator fish, etc.; and
- Extinction of fish and other aquatic species as a result of the consequences above.

Due to the above, and in accordance with the 'Polluter Pays' principle that is enshrined in the overarching environmental legislation in South Africa, there is a need to mitigate or compensate for the residual biodiversity impacts due to the bulk water infrastructure or other economic developments such as an open-cast mine. Where it is not possible to avoid or minimise (to acceptable levels) such impacts, biodiversity offsetting can be used to compensate for the same.

Biodiversity offsetting is a system that requires the use of quantitative measures to determine the amount, type and quality of the affected habitat and to establish new location(s) where it would be possible to try to re-create the same amount, type and quality of habitat using a 'No Net Loss' principle. Another option that can be used to deliver gains in biodiversity is to undertake biodiversity restoration or rehabilitation (refer to Figure 1). In other words, measurable biodiversity improvements using these systems must counteract the residual biodiversity impacts.

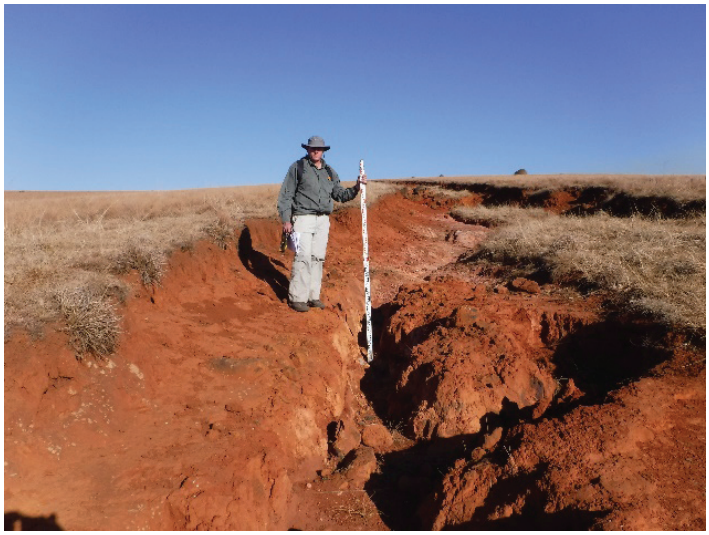

Figure 1 : Donga erosion at an offset site requiring rehabilitation.

The biodiversity offsetting was a requirement for the following bulk water and hydropower infrastructure projects:

1. Ingula Pumped Storage Scheme: 39 m high upper dam, 41 m high lower dam, headrace tunnel and hydropower plant. The environmental requirement was that "Eskom shall purchase the farms Wilge Rivier 319, Bedford 389 and Chatsworth 388 as per the recommendation in the specialist report revision 6 of October 2002… This will be known as the Bedford Wetland Park (BWP) (sic). This area shall be managed by Eskom in close co-operation with the relevant provincial departments". Eskom is a State-owned entity that is responsible for the generation and supply of electricity in South Africa.
2. Mooi Mgeni Transfer Scheme – Phase Two (MMTS-2): 37 m high dam (the Spring Grove Dam), pump station and bulk water transfer pipeline. The environmental requirements of 2009 were (i) "A detailed plan for the rehabilitation of off-site wetlands in the Mooi and Mgeni catchments to mitigate the loss of wetland function and habitat (including base monitoring). Separate plans must be submitted for each individual wetland to ensure site specific issues are included. It is recommended that the Applicant work with The Working for Wetlands programme overseen by the South African National Biodiversity Institute (SANBI) since rehabilitation activities may trigger activities listed in terms of the regulations, 2006; and which will then require an environmental assessment" and (ii) "A detailed plan of action to establish offset areas to compensate for the loss of biodiversity and habitat, and for their management during the operational phase of the MMTS-2".
3. Mzimvubu Water Project: two large dams, tunnel and hydropower plant. The environmental requirement of 2015 was for the "holder of the authorisation must contribute funds to existing conservation projects in the area, i.e. existing projects that protect crane and their foraging and breeding areas elsewhere in the Eastern Cape."

The biodiversity offsetting is fast becoming an environmental requirement on bulk water infrastructure projects in South Africa despite the Draft Biodiversity Offset Register, which was compiled by SANBI, showing no complete or successful implementation of biodiversity offset projects on 80 case studies (Brownlie *et al*. 2017).

2. INTRODUCTION

Biodiversity offsets for bulk water infrastructure projects are required in the Environmental Authorisation (EA) and Water Use License issued by the Department of Environmental Affairs (DEA), and DWS, respectively. The compliance to these legal-documents is also a condition of the loan contracts with the lenders such as the Development Finance Institutions for funding the complete bulk water infrastructure projects, and specifically to biodiversity offsetting.

Non-compliance with the above can have serious consequences such as imprisonment, fines, project delays and increased costs, loss of revenue and breach of loan contracts. It is therefore necessary to undertake various studies, and to have measures and resources in place to achieve effective and efficient implementation of biodiversity offset projects. These projects can be undertaken on state-owned or private land, but usually on the latter to avoid land acquisition and maintenance costs by the government, in this instance the DWS who are ultimately the polluter with regards to the 'Polluter Pays' principle. Please note, however, this is unprecedented in South Africa's experience of securing

biodiversity offset or receptor sites. Ultimately, the resulting improvement in the biodiversity levels at the potential offset sites will be equal to, or greater than, the impacts at the original sites.

The authorities in South Africa are no longer willing to sacrifice land that is classified as critical conservation areas for any economic and social developments. A new mega project, the uMkhomazi Water Project (uMWP) has been suspended, because a negative EA was issued in 2017. One of the main concerns related to the amount, type and quality of the biodiversity offsets. This is consistent with the European Union sustainable development "Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss".

The uMWP project will be implemented by TCTA (raw water component) and Umgeni Water (a water board) (potable water component) and it is required to supply 220 million m^3/annum of water to approximately five million people and industries in the KwaZulu-Natal Province (South Africa) for about 25 years. To exacerbate the situation, the current water supply system in the affected areas is in deficit i.e. the demand is higher than the yield.

3. CHALLENGES WITH BIODIVERSITY OFFSETS IN SOUTH AFRICA

3.1 General issues

The biodiversity offsetting is an emerging 'science' and the practice within South Africa is in its infancy stage. As such, there has been limited success on biodiversity offset projects in South Africa. The general issues that has led to this can be summarised as follows:

- Lack of research, pilot projects and successful or completed developments to inform the drafting of policies, guidelines and calculator tools.
- No guidance in the form of national or provincial policy on biodiversity offsetting, i.e. a formal policy passed by government. A national draft policy was published recently (DEA 2017).
- No official guidelines on biodiversity offsetting and calculator tools (Macfarlane et al. 2014, Ezemvelo KZN Wildlife 2010). For example, there are several ways to determine the amount of, or targets for, the biodiversity offsets. The final draft guidelines were published in 2013, however, there is no guidance on river systems.
- The conditions of the EA don't have explicit outcomes and are not being consistently included in all EAs.
- No detailed investigations during the Environmental Impact Assessment (EIA), and no prior assessment of financial requirements, technical and time considerations.

In addition to the above, TCTA has recently completed a bulk water infrastructure project in KwaZulu Natal Province, MMTS-2 will augment the water supply by 60 million m^3/annum. The construction of the infrastructure (R2 billion excluding VAT, 2019) has been completed i.e. large dam (the Spring Grove Dam), pump station and pipeline, however, the implementation of biodiversity offsets has not yet commenced – not an ideal situation.

3.2 Experience on MMTS-2 project

The experience on the MMTS-2 project has shown that the investigations and decision-making process on the planning phase took a long period – approximately eight years. One of the reasons was that the amount, type and/or quality requirements on the biodiversity offsets were not investigated during the feasibility studies and EIA, and therefore not included in the EA. The planning process was approved in 2012 after a long consultation process with the interested and affected parties, and authorities:

- Phase 1: Details of biodiversity losses and quality, and the amount/targets and type for biodiversity offsets. The report was approved by the authorities in 2013 (it should be noted that the construction of the Spring Grove Dam was completed in the same year);
- Phase 2: The first report with the basic environmental management/implementation plans was rejected by the authorities in 2015, citing insufficient details in the plans; and
- Phase 3: The second report with site-specific detailed environmental management/implementation plans was approved by the authorities in 2018.

Notwithstanding the approvals above, the main challenge is with the practicality of securing suitable offset or receptor sites. Several parcels of land were agreed with private landowners for restoring biodiversity habitats on their properties, without any financial compensation. This system relies heavily on the willingness and participation of landowners, and most of the landowners have since decided to withdraw from the biodiversity offset project. The following issues emerged as reasons for the withdrawal of potential offset sites:

1. Change in ownership of the properties and the new landowners were either reluctant to engage and/or it required considerable engagement to bring new landowners 'up to speed' with the overall process.
2. Legal disputes on the properties or estates.

3. Complicated ownership of certain properties i.e. trusts holding the land and land being leased within family/ trustees.
4. Insufficient benefits to landowners i.e. financial compensation, or prior approval for water use licenses or development rights (which were not on offer, due to item 5 below).
5. Good management of the grassland, wetland and rivers is not valued, because the properties with good biodiversity don't fetch higher prices in the market. Furthermore, there are no penalties or enforcement of legal requirements for degradation and poor management on private land. (The New Alien Invasive Species Regulation (1 October 2014) under the National Environmental Management: Biodiversity Act (Act 10 of 2004) places a legal obligation on landowners to remove and control certain invasive species on their properties (DEA 2014).)
6. Fear of losing control of the land and existing land rights, especially elderly landowners.
7. Lack of confidence in government institutions.
8. Lack of understanding of biodiversity offsetting, despite the extensive consultation process.
9. Tensions and disagreements between neighbouring landowners.

Due to lack of partnerships with the landowners, and considering bullets 4 and 6 above, most of the landowners that had initially agreed to having offset sites on their land withdrew from the biodiversity offset project.

3.3 Experience on other projects (e.g. Ingula Pump Storage Scheme)

Unlike TCTA who is an implementing agent for the DWS for the construction of government water works, Eskom is involved wholly in the operation of the infrastructure to generate, transmit and distribute electricity, and was therefore able to meet the requirement for the biodiversity offsets by purchasing land adjacent to the Ingula Pumped Storage Scheme that is located on the cross-border of the Free State and KwaZulu-Natal provinces. This portion of land has been declared a nature reserve in 2018. Eskom entered into negotiations with non-profit organisations, BirdLife South Africa and the Middelpunt Wetland Trust forming the Ingula Partnership in 2003. They jointly manage the Ingula Nature Reserve, which approximately 7637 ha

4. IMPACT ON RESOURCES

The overall cost for the planning exercise for the MMTS-2 project was approximately R4 million and the initial overall budget for both the planning and implementation was R10 million in 2010 (excluding VAT). In 2019, the phase 3 – detailed environmental management/implementation plan estimated an amount of R47 million for the implementation, which excludes the R4 million mentioned above, resulting in approximately R33,100/ha (excluding VAT and compensation for acquired land). The total is approximately 8% of the construction costs of the Spring Grove Dam.

There is a limited number of 'experts' who specialise in biodiversity offsetting in South Africa. Nonetheless, this resource is necessary for successful planning, design, implementation and monitoring of the biodiversity offsets. Experienced and pragmatic biodiversity offset specialists are needed to provide clear guidance, advice and recommendations on suitable approaches to biodiversity offsets and the management thereof.

5. CONCLUSIONS AND RECOMMENDATIONS

There are several challenges relating to biodiversity offsetting in South Africa. The weakest link in the implementation lies with the lack of policy, guidelines and partnerships. Most landowners don't have an interest in biodiversity offsets. To try to address the challenges, other alternative options should be pursued *inter alia*:

- Biodiversity banking that provides a means to place a monetary value on ecosystem services. A developer or implementing agents can then purchase compensation credits with a certified 'biodiversity bank' or suitable nature conservation agency or organisation, who can then promote, develop and expand the protected areas under the National Protected Areas Expansion Strategy for South Africa by the DEA (2016), and direct the management of sustainable biodiversity conservation.
- Developers or implementing agents to purchase or expropriate land based on market-related financial compensation. The land acquired will be used for biodiversity offsetting and shall form part of the protected areas of South Africa e.g. nature reserves, national parks or registered conservation servitudes. Alternatively, donate the land and/or compensation to a suitable nature conservation agency or organisation for the same.
- Detailed and non-ambiguous requirements on biodiversity offsetting should be included in EAs.

6. LESSONS LEARNT

The main lessons learnt:

1. The complexity and size of biodiversity offsets were misunderstood and miscalculated. The total amount required for biodiversity offsets (Table 2) is almost double the surface area of the Spring Grove Dam at Full Supply Level of 1022 ha, therefore at least three times the extent of the biodiversity loss should have been budgeted for. Higher offset targets can be expected on future projects, for example, 13:1 for the new uMWP.

2. The risk of delays and failure to meet the total amount of biodiversity offset to be secured is high. The number of landowners and properties earmarked for biodiversity offsetting reduced from 19 and 11 to 5 and 2, respectively. Thus, the actual total amount of biodiversity offsets will be 1541 ha and 16.4 km. The partnership with the owners of the land that have been proposed or required for the offset sites is vital for the success of the biodiversity offset projects, from planning to close-out stage, therefore other methods to secure the offset sites should be considered.
3. The management of biodiversity offsets will be in perpetuity, 30-year period or same period as the operation and maintenance of the bulk water infrastructure i.e. operation and maintenance.

Table 2 : The amount of biodiversity offsets.

Ecosystem	Extent of loss	Total to be secured	Total that can now be secured
Grassland	210 ha	630 ha*	1303 ha
Wetland	462 ha	1386 ha*	238ha
River	15.5 km	15.5 km	16.4 km

*Determined at three times the extent of loss.

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