Talking dirty - effluent and sewage irreverence in South Africa: A conservation crime perspective

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Abstract: The deteriorating state of municipal wastewater and sewage treatment management in South Africa is one of the largest contributing factors to the numerous pollution problems experienced in most parts of the country and a major contributor to environmental and human health problems. The state’s incapacity to fulfill its basic mandate on all three spheres of governance (national, regional and local) of effectively protecting the rights and property of all persons (natural and juridical), frustrates economic growth, and is paralleled only by its dedicated neglect of limited natural resources. This article provides a metaphysical overview of the proximate and diffuse causes of the environmental and social issues impacted by this Manichean form of thinking, placing in context the increasingly opaque silhouette of the interface between waste water mismanagement (irreverence), on the one hand, and the enviro-social impact (victimisation) thereof on the other.

Keywords: Conservation crime; waste water; pollution; governance; enviro-social interface; victimisation; maladministration; eutrophication; eco-pragmatism

1. Introduction
Rapid urbanisation, together with accelerated economic development in South Africa, is placing enormous strain/stress on urban, peri-urban and rural environments, especially in the underdeveloped areas of South African cities and towns (communities). An exponential growth in waste volumes has accompanied this trend, but appears to have been inadequately catered for by those entities responsible for its management. It is, in fact, estimated that during 2015, eighty percent (80%) of South Africa's fresh water resources were so badly polluted that no purification processes...
in the country could make it fit for consumption. In South Africa, three spheres of government exist, each possessing their own unique functions within these three distinctive, interdependent and interrelated spheres. The principles of cooperative governance provide that all interactions between the three spheres of government must play out in a coordinated and cooperative manner (Algotsson, Mwambo, Davis, & Poole, 2009). Despite clearly documented initiatives/policies, guidelines and legislation (designated below) regarding the division of roles, responsibilities and mandatory obligations for the three spheres of South African government (national, provincial and municipal), wastewater management has, for the most part, been administered in an inefficient manner, and is increasingly educing the public’s resentment. Widespread infestation of corruption and endogenous malfeasance, especially in the municipal sector, has augmented the problem of effective waste abstraction and created serious contamination and health issues across the board. Although abbreviated and derisory waste water mismanagement may appear to be just another local government indiscretion in a growing list of failures, it does unfortunately have more insidious undertones.

Pollution, in all its guises, but specifically through the ineffective management of sewage and effluent, is a conservation crime in the sense that it ruinously impacts on biodiversity (wildlife and plants) and the trophic webs that permeate natural ecosystems, whether terrestrial, marine or aquatic. Hypertrophication (of water bodies, such as wetlands, rivers and riparian zones), clogs natural life-giving conduits and fresh water filters, killing a myriad of organisms as well as those species dependent upon them for survival (Chislock, Doster, Zitomer, & Wilson, 2013). Human health, as well as economic wellbeing, is also detrimentally impacted, specifically in less affluent communities. Consequently, what might, on the surface, seem to be “minor environmental indiscretions” can have serious and long-lasting effects on both the receiving environment and humans, directly and indirectly (much like Lorenz’s (1963) butterfly effect theory, which advocates that accruing small changes or forces can have massive repercussions elsewhere). As such, sustainability and improvement of waste management services remains a significant challenge for the government (Algotsson et al., 2009). This article chronicles the deteriorating municipal waste water management crisis in South Africa and the various pollution-related indiscretions being leveled at the environment (as a primary victim) and communities (as secondary victims) from a conservation crime standpoint. In broad brushstrokes, rather than by way of encyclopedic exposition, a “water crime” mosaic is assembled to facilitate understanding, and ultimately, suitable intercession. The concepts, sewage, effluent, and waste water, due to their analogous meaning, are used interchangeably. “Conservation crime” is a semantical derivative of the more casually used term “environmental crime” and is the preferred terminology when addressing issues relating to criminality directed at natural resources (Gibbs, Gore, McGarell, & Rivers, 2010; Herbig & Joubert, 2006). Conservation crime can be defined as “any intentional or negligent human activity or manipulation that impacts negatively on the earth’s biotic and/or abiotic natural resources, resulting in immediately noticeable or indiscernible (only noticeable over time) natural resource trauma of any magnitude” (Herbig & Joubert, 2006, p. 96).

2. The current situation in South Africa: What’s all the stink about?
Water supply and sanitation in South Africa (SA) is characterised by both achievements and challenges. After the end of Apartheid (1994), SA’s newly elected government struggled with the then growing basic service delivery impasse and backlogs with respect to access to water supply and sanitation. The government, thus, made a strong commitment to high service standards and to high levels of investment subsidies to achieve those goals. Since then, the country has made some progress with regard to improving access to water supply and sanitation functioning, but is still, for the most part, failing to meet minimum standards, especially in rural areas and informal settlements.

Contributing to this state of affairs is the fact that South Africa’s municipal sewage system has largely collapsed and become predatory. Of the 824 treatment plants, it is estimated that only 60 release clean water (SA facing waste water pollution problem, 2010; Kings, 2017b). Raw or partially
treated sewage flows into rivers throughout the country, turning dams green, laying waste to fragile ecosystems and harming people who drink the polluted water. From large metros, such as Johannesburg, to smaller rural towns; what is flushed down the toilet frequently either escapes out of broken pipes or from the plants meant to treat it back to safe quality. Odendaal (2017), in fact mentions that the civil rights organisation AfriForum found that the drinking water of 3 municipalities in South Africa failed to meet the national standards for quality drinking water, while 59 failed to meet the set quality standards for sewage systems. The water tests conducted by AfriForum show worrying results, especially in terms of poor sewage management and indicate the “continuous decline in South Africa’s infrastructure and a lack of skilled personnel to manage water bodies.” AfriForum, furthermore, revealed a drastic decline in the management of sewage water treatment plants in South Africa, with an average of 67 percent of South African sewage water systems not functioning within the regulatory requirements. The 59 waste water plants that do not meet the standards pose a threat to human health, food security and the environment (Odendaal, 2017).

South Africa is comprised of 9 provinces. According to Odendaal (2017), the waste water issues in these provinces currently looks as follows: Fifteen towns across 5 municipalities in southern and northern Gauteng (SA’s most populated province) do not comply with South Africa’s national water quality sewage standards, while 7 towns in 4 municipalities in the Western Cape failed to meet requirements. Twelve towns spread across 11 municipalities in Mpumalanga and 6 towns spread across 6 municipalities in North West also present with sub par water sewage quality. The Northern Cape (the most sparsely populated province) was home to 2 towns across 2 municipalities with poor quality sewage treatment, and in the Eastern Cape, towns in 5 municipalities fell short. Four municipalities from Limpopo and KwaZulu-Natal each found themselves on the list, along with 3 towns in 4 municipalities in the Free State (Odendaal, 2017).

As a case in point, Kings (2017a) affirms that in the past 6 years, 36 wastewater treatment plants around the country have been visited with few working properly. Kings (2017a) relates how, at one plant in the Limpopo province, operators use a handbook with a third of its pages missing to calculate how much chlorine and lime to add to their treatment process. The ratio, meant to be informed by sampling and laboratory results, was being done by guesswork. An operator confessed that they got the job because they knew the plant’s manager (Kings, 2017a).

Reprehensibly, it is not a new problem. In its 2006 State of Municipal Infrastructure report, the Council for Scientific and Industrial Research (CSIR) found that plants were “producing effluent that is little distinguishable from the raw sewage going into the works” (Kings, 2017a, p. 1). It blamed this on “gross under budgeting by the municipality” and “managers who have insufficient understanding of the technology of wastewater treatment”. It concluded that it was “illogical to build more waste water and sewage infrastructure without addressing the underlying factors that lead to the failure of this infrastructure” (Kings, 2017a, p. 2). Twelve years later, it appears from South Africa’s dismal track record outlined in this article, that the situation has deteriorated even more and that the end is not yet in sight. Ironically, instead of upholding the well-known principle of “the polluter pays”, SA waste water authorities seem to be subscribing to a new principle, namely, “pay the polluter” (themselves).

3. Waste water (mis)management in South Africa—“troubled waters”?

As the responsibility of each municipality—the state of SA’s waste water is literally in “deep water”. According to the South African Constitution, 1996 (Act 108 of 1996), the Municipal Structures Act, 1998 (Act 117 of 1998), Municipal Systems Act, 2000 (Act 32 of 2000) and the Water Services Act of 1997 (Act 108 of 1997), responsibility for the provision of water and sanitation services lies with water services authorities, which the Water Services Act defines as “the municipalities”. Amongst those mentioned above, and others, the following national legislation specifically focuses on pollution and waste water management in South Africa; the National Water Act, 1998 (Act 36 of 1998), the National Environmental Management Act, 1998
Section 74 of the NWA, for example, gives the minister powers to issue directives against water management institutions, such as a municipality; as a result of the execution of its functions or performance and also to issue administrative fines (differ from criminal fines). The MEMA governs the environment in its entirety and works in tandem with the NWA. Regulations promulgated in terms of these statutes, as well as provincial and local government ordinances/by-laws are also in force to ensure compliance with waste water management and pollution. In terms of Part A of Schedule 4 of the South African Constitution (1996), pollution control is a Functional Area of Concurrent National and Provincial Legislative competence. However, in terms of Part B of the same Schedule, Local government, i.e., District municipalities and Local municipalities retain responsibility for water sanitation services (including waste water and sewage disposal systems) as an Exclusive Functional Area. This essentially means that local government is responsible for waste water management (“pollution disposal”) on a day-to-day basis and provincial and national government is responsible for steering, oversight and monitoring (“pollution control”) (Nkosi & Odeku, 2014). The following are examples of local legislation that municipalities (local authorities) are required to comply with and, in many instances, also required to enforce (Algotsson et al., 2009): Section 9(1)(a)(iii) of the Housing Act, 1997 (Act 107 of 1997) as amended states that, “Every municipality must, as part of the municipality’s process of integrated development planning (IDP) take the reasonable and necessary steps to ensure that services in respect of sanitation and storm water drainage are provided in a manner which is economically (and environmentally) efficient.”

According to Nkosi and Odeku (2014), Section 20 of the Health Act, 1977 (Act 63 of 1977) provides that:

(1) “Every local authority shall take all lawful, necessary and reasonable practicable measures.

(a) To maintain its district at all times in a hygienic and clean condition;

(b) To prevent the occurrence within its district of—

(i) Any nuisance;
(ii) Any unhygienic condition;
(iii) Any offensive condition;
(iv) Any other condition which will or could be harmful or dangerous to the health of any person within its district or the district of any other local authority, or, where a nuisance or condition referred to in subparagraphs (i) to (iv), inclusive, has so occurred, to abate, or cause to be abated, such nuisance, or remedy, or cause to be remedied, such condition, as the case may be;

(c) To prevent the pollution of any water intended for the use of the inhabitants of its district, irrespective of whether such water is obtained from sources within or outside its district, or to purify such water which has become so polluted ... ”

The dilemma here is, however, not so much the enforcing of waste water non-compliance by municipalities themselves (municipal law enforcement) in their respective jurisdictions, but rather the inability of individual municipalities to comply with these selfsame laws—a case of who is monitoring the monitors? National and provincial authorities, as statutory guardians/gate keepers, appear to be soft-pedaling, and, in many instances, disregarding their monitoring/enforcement role (in relation to municipalities) whilst they hold precious water resources, and the management thereof, in public trust for the people of South Africa (Algotsson et al., 2009; Mabuza, 2017). The principles of cooperative government discourage litigation between and among government departments and spheres of government, with the repercussion that neither national nor provincial governments have the political will to take municipalities to task where they fail to deliver water services (Algotsson et al., 2009). Many municipalities are, subsequently, exploiting the situation and mismanaging waste water with impunity.
There are 52 district municipalities (serving rural areas) and 231 local municipalities (serving urban areas) in South Africa. In many cases, the district municipalities are the water services authorities. However, the national government can assign responsibility for service provision to local municipalities. Overall, there are 169 water services authorities in South Africa including government owned water boards, district municipalities, local municipalities and municipal companies. Disappointingly, the lines between such clear divisions are increasingly blurred and the concepts of reality, realism and representation, slippery and complex. A recent (2017) report measuring the state of waste water treatment plants in all 9 of South Africa’s provinces, revealed that while less than half of South Africa’s more than 820 sewage treatment plants are treating the billions of litres of waste matter that they receive each day to acceptable standards, only 7 percent actually comply with international benchmarks and standards (Sewage system instalations—the future of waste water treatment in South Africa, 2017). What this means, is that sewage is not being adequately treated in most of South Africa’s waste water treatment plants, which, in turn, means sewage leachate is running into the ground, ocean, and local river systems, thus affecting (victimising) rural communities, farmers and entire terrestrial, marine and aquatic ecosystems.

While every South African has a basic human right to an environment that is not harmful to their wellbeing and to have an environment that is protected for the benefit of present and future generations—this is simply not the case when it comes to South Africa’s sewage water. Whether it is due to finances, corruption, lack of expertise, or poor to non-functional processes, it has become quite evident that South Africans can no longer rely on municipalities to treat and deliver clean and safe water. Consonant with the foregoing, Kings (2015) relates the following in respect of South Africa’s premier dam, the Vaal Dam, which was built as a job creation programme in the 1930s during the Great depression. The dam, with its billion cubic metres of water, supplies most of the Gauteng province’s drinking water (to approximately 10-million people), and serves as a catchment for rivers in the Gauteng, Free State, North-West and Mpumalanga provinces. According to an independent (2015) report, several water quality issues have been identified regarding the quality of the Vaal River system, which include an increase in salinity, sulphates, nitrates, phosphates, microbial pollutants, and dissolved solids (Aukema, 2017). The report identifies most municipalities around the dam as being in contravention of the National Water Act, because their waste water treatment works are running at 100–200 percent capacity, and are releasing unsafe levels of ammonia and E. coli. One commentator is quoted as saying that “all they can do is to keep diluting water in the Vaal (dubbed ‘fixing pollution with dilution’) as there is little will to really tackle the problem: the polluters … especially since local government (municipalities) is such a big source of that pollution”. The last Green Drop report released publicly in 2013, in fact stated that 6 treatment plants around the Vaal Dam were releasing “noncompliant” water, in other words, illegal water.

Consonant herewith, in 2015 a municipality was caught red-handed on video pumping millions of litres of untreated sewage (conservatively estimated to be 150 Megalitres daily) into the Vaal River and Vaal Dam, which has significantly contaminated the water for 10-million people (Four Facts about Sewage Treatment in South Africa You Should Know, 2019; Hosken, 2018). It should be noted, however, that SA’s water pollution crisis is not, by any means, confined to the Vaal River and dam, though it is singled out because the system supports about 60% of the SA economy and provides drinking water to about 45% of the population (The reality of South Africa’s Wastewater Treatment Technology, 2014).

In further support of the judgment that many municipal water plants are poor to non-functional and are negatively impacting the environment, it was recently (2016) discovered that nearly 50 million litres of dirty raw sewage, grey water and toxic chemicals are being dumped off the coast of Cape Town (a premier South African tourist destination under control of the Cape Town Metropolitan Municipality), every day (Four Facts about Sewage Treatment in South Africa You Should Know, 2019). With over 30 million litres, 5, 5 million litres, and 2 million litres of raw sewage...
flowing from the Cape Town communities of Green Point, Hout Bay, and Camps Bay respectively; not only does this pose a huge problem to marine life (constituting a conservation crime), but also greatly affects tourism and the economy (Sewage system installations—the future of waste water treatment in South Africa, 2017). Waste water treatment works in most municipalities are in a state of decay due to poor maintenance. The situation is also compounded by the fact that communities are expanding apace, while infrastructure is not. This inevitably leads to overloading, which in turn leads to spillages. Unfortunately, most plants are operating above their design capacity (SA’s waste water treatment works in bad shape, 2016).

Waste water treatment works in most municipalities are in a state of decay due to pathological poor maintenance. This leads to overloading, which in turn leads to unregulated decantation. Out-of-pocket municipalities are unable to maintain ageing sewage works resulting in faecal matter and other comparably toxic substances in wastewater systems entering storm-water systems and draining into the country’s rivers, impoundments and oceans (The reality of South Africa’s Wastewater Treatment Technology, 2014), but are able to pay their staff and councilors the often above-average salaries they command, without fail. Unfortunately, most plants are operating above their design capacity (SA’s waste water treatment works in bad shape, 2016). The Department of Water and Sanitation (DWS) has expressed concern over the levels of sewer pollution in the country, mainly due to the poor state of SA’s waste water works. The DWS reports that it has encountered high levels of sewer pollution, which has negatively impacted water quality. Upon further investigation, it was discovered that the pollution was mainly caused by dysfunctional municipal waste water treatment plants (SA’s waste water treatment works in bad shape, 2016; The reality of South Africa’s Wastewater Treatment Technology, 2014). It is evident that South Africa cannot continue to allow incompetent or disinterested local municipalities to mismanage the future of its water supplies.

4. Municipal waste water mismanagement: “The filthy truth”

Crystallising from the foregoing is the fact that municipal mismanagement is at the core of the derisory waste water phenomenon in South Africa. The following reasons are coagulated by Sell (2016) for this substandard state of affairs.

- Municipalities, especially smaller ones, do not have the financial resources or skills to properly address the challenges of sewage processing and disposal. Urban expansion is also outstripping their ability to keep up with demand.
- Many municipalities have the mistaken belief that water purification at the drinking end of the cycle mitigates their lack of concern for polluting the input to this process. All they are really doing, however, is moving the problem from the back end, to the front end, as it were. While they may be reducing costs for processing sewage, they are exponentially increasing water purification costs.
- In several instances, recorded by AfriForum’s own Green Drop report, the purification processes are themselves inadequate.
- “He who pays the Piper ... ” the appointment and briefing of consultants, particularly environmental consultants, is systemically flawed. There is no blame attached here as they are fulfilling the mandate of their client (the municipality). So, if their client says that “We need you to justify what we have already done ... ” or “we need the cheapest, not necessarily the best option ... ” etc, then that is what they have to provide.
- To do otherwise is professional suicide. Yet, when we are talking about a national strategic asset, should consultants not be obliged to identify the best possible long-term options, irrespective to perceived short-term costs?
- The DWS issues Water Use licences based on an assumption that licensees are going to abide by the standards stated in their licence. Yet, the DWS either has no teeth, or just can’t be bothered to enforce these standards.
5. The South African constitution—“paying lip service”

The South African Constitution’s declaration regarding citizens’ rights in relation to the environment can be regarded as an appropriate anchor point for this article, since water is a National Strategic Asset and should be managed as such. The right to basic sanitation is, however, not an explicit constitutional right, but can be derived from the right to a clean environment read together with the right of access to clean water (Algotsson et al., 2009). Technically, by not meeting minimum required standards for effluent discharge, many (read most) municipalities are in continuous breach of Chapter 2, Section 24 of the South African Constitution, 1996 (Act 108 of 1996), which states (Drummond, 2017; Sell, 2016):

Everyone has the right:

(a) To an environment that is not harmful to their health or well-being; and
(b) To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that
(i) Prevent pollution and ecological degradation;
(ii) Promote conservation; and
(iii) Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

Yet, little to nothing is done to challenge their indifference to this constitutional obligation. The already dire situation has been exacerbated by the prevailing drought conditions, which further highlights the need for high-level strategic interventions. Interventions that bring skills and enough clout to knock the system back into shape. Life simply cannot continue without clean water, and a healthy environment (Sell, 2016).

6. Green drop status and (non)compliance

According to Excellence in wastewater (2017), Green Drop certification (a report produced by the DWS), is an incentive-based regulation that focuses on the entire waste water business of the water services institutions. Because sewage plants are run by municipalities, the national department has little jurisdiction over what they do. The Green Drop report is, therefore, used to “shame municipalities into action”. It is a critical driver to improve and turn around sub-standard waste water management services, whilst recognising and rewarding excellence in the sector. The certification programme recognises competency. It ensures that treatment processes continue without interruption and with great responsibility and due diligence in ensuring that public health is protected and the environment is conserved for future generations (Excellence in wastewater, 2017).

Interestingly, the Green Drop reports are, since 2013, no longer available to the public, ensuring that culpability is being swept under the carpet, so to speak. (Kings, 2017b). This, ostensibly due to the Green Drop documents containing such damaging evidence, that it would enable people to sue the government. In fact, the last publicly available report in 2013 noted that less than 10 percent of the country’s 824 plants were releasing clean water (Kings, 2017b). The rest were breaking the law, with a third rated as “critical” and in need of urgent repair (Kings, 2017b). This equates to 50 000 litres of untreated sewage released every second. This (2013) report also noted that staff attitudes at sewage plants are apathetic and unresponsive, and that poor management practices are evident (Drummond, 2017).

Despite the noble aspirations of the Green Drop initiative, the DWS is also gravely concerned with the poor performance of most municipalities in terms of the Green Drop report. The DWS cites this as one of main reasons for interventions into the municipalities that negatively affect the water quality in the sources such as rivers, streams and dams (SA’s waste water treatment
works in bad shape (2016). AfriForum released a report in 2016 after testing the sewage (system) quality in 72 towns across SA. Twenty-seven of these systems did not meet the quality standards of 1000 units of E. coli per 100 ml water in treated sewage. The 27 sewage plants that did not meet the standards may be seen as a threat to human health, food security and the environment. According to AfriForum, the Mpumalanga province was a particularly bad offender. Of the 13 towns tested, only 4 fell within the set microbiological standards and 8 towns did not adhere to applicable regulations. Gauteng province (SA’s business capital and most populated province), also performed badly with the sewage of only 3 of the 9 areas tested meeting the set microbiological standards. Eight towns were not adhering to regulations. (SA’s waste water treatment works in bad shape, 2016). AfriForum again tested the sewage water systems of 88 towns in May and June 2017, of which 59 did not meet the set quality standards. This is compared to 27 out of 72 sewage water systems that did not meet the standards in 2016. Clearly, the management of sewage water treatment plants in South Africa is declining radically. In a nutshell, Sell (2016) states that the 4.9 percent of waste water treatment plants that did achieve Green Drop status (40 out of 821) attend presentation ceremonies and pat themselves on the back. The other 95.1 percent apparently couldn't care less (SA boasts top notch water, but lacks in sewage management, 2017). Until there is a punishment to fit the crime, and pollution is a crime, all the unenforced standards will allow mismanagement to continue unabated.

7. Ramifications of waste water mismanagement

7.1. Conservation crime in perspective

Water pollution, as a conservation crime (and indeed, in relation to most forms of conservation crime), is primarily addressed in terms of its impact on human victims (i.e. water borne sicknesses, proliferation of pests, depreciation of property value, poverty, fouls smells, and in extreme cases, culpable homicide and/or murder), and secondly (if at all), in terms of its impact on the environment/biosphere, i.e., as a derivative impact. This is of course in line with the omnipresent phenomenon of normalised (societal) anthropomorphism or environmental alterity, a viewpoint that fails to acknowledge sufficiently the impact of certain crimes on the environment (which would equate to a more biocentric appreciation of the world). In capitalistic consumerist societies, human importance far outweighs that of the environment, think, for example, of the redundant consuming, by certain societies, of rhino horn products, the killing of captive lions for their bones, and the poaching of African elephants to fashion ivory trinkets, to name but a few.

Unfortunately, law enforcement agencies, criminal justice systems and the majority of citizen crime commentators alike, usually accord natural resource offences a low (or lower) priority in comparison to other more general crimes impacting the public directly (Cook, Roberts, & Lowther, 2002; Herbig, 2008, 2010, 2018; Moreto, Brunson, & Braga, 2015). Compounding this state of affairs is the fact that society is generally less responsive towards natural resource crime issues and has, over the years, to a large extent been increasingly desensitised towards it through widespread concern over rampant conventional criminal activity (Kidd, 1997). The mounting problem of heinous and violent crime in South Africa undeniably rides roughshod over environmental issues. This state of affairs has, it would seem, done little to promote the censure of conservation-related crime, but rather served to enervate the reprehensibility thereof. In a third world country, such as South Africa, where a large percentage of the population is undereducated and lives below the bread-line (Herbig & Joubert, 2006), people tend to, not generally, be environmentalists as they have more expressive concerns on their minds (even though they might be victims of conservation crime). This situation can be expected to continue until South African society reaches a critical mass of relatively affluent and educated people (with time on their hands). Only then will natural resource perturbation acquire a higher status amongst the general population. People are, in essence, all environmentalists, once they have sufficient wealth and security to concern themselves with things beyond their immediate survival (Ally, 2017). The vexing question is, however, if, in the case of South Africa, the attainment of this threshold will come too late? Consonant
herewith, conservation crime is also frequently of a surreptitious and licentious nature—out of the public eye, resulting in its detrimental effects only becoming visible in the medium to long-term—a case, perhaps, of being concealed in plain sight? A case in point is the fact that most local authorities disgorging effluent that does not meet minimum legal discharge standards are located in low income communities, where ordinary crime is unbridled and day-to-day survival (not environmental issues) is paramount (Mema, 2018).

7.2. Conservation crime valence
First and foremost, waste water mismanagement and irreverence (in most guises) directly constitute a conservation crime in the sense that natural resources (as primary victims), are harmed, sometimes irreparably (and in many cases, imperceptibly—at the outset)—regardless of the fact that its effect on humans (as secondary victims) is considerably more perceptible, especially in the short-term. Organisms, including endemic and indigenous species, can be lost or populations reduced to unsustainable numbers, while specialised habitats can be destroyed or damaged beyond viable biological thresholds. Delicate trophic webs can remorselessly be interrupted by noxious sewage/effluent flowing into the environment. Disruptions in ecological homeostasis can have far-reaching effects on both higher and lower organisms, and ultimately impact human-kind. Conservation crime does, however, also have other sinister undertones as it could also easily translate (and often does) into crimes other than those affecting the natural environment. The effects of the conservation crime (indirectly), i.e., humans consuming polluted water or toxic organisms, can then result in the development of further crimes, such as culpable homicide, or even murder (where dolus eventualis is a factor), should humans die because of negligent or intentional actions.

The concern is, however, when the current warning signs being broadcast by the anthropogenically-induced pressures on the biosphere will be heeded? Can policy changes, technological developments and remedies at this advanced stage of biological decay still provide remedies to the situation, or are the environmental changes already irreversible and only slowable to decelerate the inevitable species decline and extinctions?

Several scenarios are discussed below, which primarily emphasise the conservation crime and victimisation potential of ineffective waste water management, but also allude to the effect of waste water transgressions on humans (Rand Water, 2017; Tilman, 1999).

7.3. Waste water pollution: Extent and consequences

7.3.1. Eutrophication
Some chemicals, like fertilisers, are made of substances that occur naturally in the environment, but only in small amounts. When too much fertiliser is washed from farmlands into a river, that water will also become polluted. Human sewage or cattle excrement that is untreated (or under-treated for that matter) also causes water pollution in the same way as fertilisers do. Human sewage also contains germs that spawn diseases, such as hepatitis and cholera. Soaps and washing detergents contain both natural and man-made (artificial) chemicals. The natural chemicals can cause a pollution problem similar to that caused by fertilisers. Phosphates and nitrates are found in fertilisers, sewage and soaps. Phosphorous is an essential element for life, both as a nutrient for plant life and as a key element in the metabolic processes of all living things. The normal low phosphate (\(\text{PO}_4\)) level in water inhibits the growth of plants, but a small increase of phosphates can result in the rapid increase in plant growth, such as blue-green algae, and water hyacinth in dams (Chislock et al., 2013). The water plants become overcrowded and die. When they die the decomposing bacteria uses up more oxygen and affects other forms of life negatively, e.g. fish suffocate. This process is called eutrophication.

Eutrophication, or more accurately hypertrophication, therefore, is the ecosystem response to the addition of artificial or natural substances, such as nitrates and phosphates, through fertilisers or
sewage to an aquatic system (Boesch, 2019). One example is the “bloom” or massive increase of phytoplankton in a water body as a response to increase levels of nutrients. Negative environmental effects include hypoxia, the depletion of oxygen in the water, which induces reductions in specific fish and other animal populations. Human contact with these blooms can cause illness such as hay fever, skin rashes, eye irritations, vomiting, gastroenteritis, diarrhea, fever and pains in muscles and joints, and in extreme cases, death.

7.3.2. Lakes and rivers (aquatic environment)
Eutrophication can be human-caused or natural. Untreated sewage effluent and agricultural run-off carrying fertilisers are examples of human-caused eutrophication. However, it also occurs naturally in situations where nutrients accumulate or where they flow into systems on an ephemeral basis. Eutrophication generally promotes excessive plant growth and decay, favouring simple algae and plankton over other more complicated plants and causes a severe reduction in water quality (Chislock et al., 2013). Phosphorous is a necessary nutrient for plants to live and is the limiting factor for plant growth in many freshwater ecosystems. The addition of phosphorous increases algal growth, but not all phosphates feed algae. These algae assimilate the other necessary nutrients needed for plants and animals. When algae die they sink to the bottom where they are decomposed, and the nutrients contained in organic matter are converted into inorganic form by bacteria. The decomposition process uses oxygen and deprives the deeper waters of oxygen, which can kill fish and other organisms (entire populations can be wiped out). Also, the necessary nutrients are at the bottom of the aquatic ecosystem and if they are not brought up closer to the surface, where there is more available light allowing for photosynthesis for aquatic plants, a serious strain is placed on algae populations.

Enhanced growth of aquatic vegetation or phytoplankton and algal blooms disrupts normal functioning of the ecosystem, causing a variety of problems, such as a lack of oxygen needed for fish and shellfish to survive (Chislock et al., 2013). The water becomes cloudy, typically a coloured shade of green, yellow, brown, or red. Eutrophication also decreases the value of rivers, lakes and estuaries for recreation, fishing, hunting, and aesthetic enjoyment and can even result in the development of drug-resistant microbes (Cape Town oceans contaminating marine life, 2019). Health problems can of course also occur where eutrophic conditions interfere with drinking water treatment. Notwithstanding, pesticides (contributing to eutrophication) are acknowledged as one factor in plummeting populations of many insects associated with aquatic environments and the avifauna that rely on them for food.

7.3.3. Ecological effects
Many ecological effects can arise from stimulating primary production, but there are three particularly troubling ecological impacts: decreased biodiversity, changes in species composition and dominance and toxicity effects.

7.3.4. Decreased biodiversity
When an ecosystem experiences an increase in nutrients (nutrient pollution from human activities, such as fertiliser and pesticide run-off), primary producers reap the “benefits” first. In aquatic ecosystems, species such as algae experience a population increase (an algal bloom) (Chislock et al., 2013). Algal blooms limit the sunlight available to bottom-dwelling organisms and cause wide swings in the amount of dissolved oxygen in the water. Oxygen is required by all aerobically respiring plants and animals and it is replenished in daylight by photosynthesising plants and algae. Under eutrophic conditions, dissolved oxygen greatly increases during the day, but is greatly reduced after dark by the respiring algae and by microorganisms that feed on the increasing mass of dead algae. When dissolved oxygen levels decline to hypoxic levels, fish and other aquatic animals suffocate. As a result, creatures such as fish, shrimp, and especially immobile (sedentary) bottom dwellers die off. According to Chislock et al. (2013), in extreme cases, anaerobic conditions ensue; promoting growth of bacteria such as Clostridium botulinum that produce toxins deadly to birds and mammals (including humans). Zones where this occurs are known as oxygen minimum zones or dead zones (Chislock et al., 2013).
7.3.5. New species invasion

Eutrophication may cause competitive release by making abundant a normally limiting nutrient. This process causes shifts in the species composition of ecosystems. For instance, an increase in nitrogen might allow new, aggressive species to invade and out-compete original inhabitant species (Chislock et al., 2013). The establishment of such species will have far-reaching effects on the entire ecosystem, and generally debit its inherent value. Consonant herewith, (Brisman & South, 2019, p. 6) aver that such conditions are conducive to allochthonous species out competing and preying on autochthonous species.

7.3.6. Toxicity

Some algal blooms, otherwise called “nuisance-algae”, are toxic to plants and animals. The toxic compounds they produce can make their way up the food chain, resulting in animal mortality. When the algae die or are eaten, neuro-and hepatoxins are released which can kill animals (wild and domestic) and can pose a threat to humans. An example of algal toxins working their way into humans is the case of shellfish poisoning. Biotoxins created during algal blooms are taken up by shellfish (mussels, oysters) and even rock lobster, leading to these human foods acquiring toxicity and poisoning humans (see below). When toxicity causing human sickness/death is the result of intentional or negligent sewage/waste water discharge, such discharge can be regarded as criminal and the polluter should retain culpability in this regard.

7.3.7. Ocean waters (marine environment)

Eutrophication is a common phenomenon in coastal waters. In contrast to aquatic (freshwater) systems, nitrogen is more commonly the key limiting nutrient of marine waters; thus, nitrogen levels have greater importance to understanding eutrophication problems in salt water (Boesch, 2019). Estuaries (fresh-water and salt-water interfaces) tend to be naturally eutrophic because land-derived nutrients are concentrated where run-off enters a confined space. Upwelling in coastal systems also promotes increased productivity by conveying deep, nutrient-rich waters to the surface, where nutrients can be assimilated by algae. In addition to run-off from land, atmospheric fixed nitrogen can enter the open ocean. A study in 2008 found that this could account for around one-third of the ocean’s external (non-recycled) nitrogen supply, and up to 3 percent of the annual new marine biological production. It has been suggested that accumulating reactive nitrogen in the environment may prove as serious as putting carbon dioxide in the atmosphere. When human pollution enters this equation, and bolsters the nitrogen and heavy-metal content of the marine environment, the potential hazard increases ten-fold. Consonant herewith, research has revealed that great white sharks off the South African coast have high concentrations of mercury, arsenic and lead (all heavy metals) in their blood (Heavy metals found in great white shark off SA coast, 2019). As apex predators, sharks bio-accumulate toxins in their tissues via the trophic web (food chain) from their prey. By measuring concentrations of toxins, such as mercury and arsenic, in the blood of white sharks, they can act as “ecosystem barometers” for environmental vigour with ramifications for humans. By implication, if the sharks have high pollutant levels in their tissues, it is likely that species they eat below them in the food chain will also have toxins, including fishes that humans eat.

This, is in fact, confirmed by Marine: Cape Town oceans contaminating marine life—study (2019) stating that a recent investigation has revealed that the Cape Town coastline is so polluted that pharmaceutical and industrial compounds are accumulating in the flesh of fish caught off the coast. The report articulates that scientists from the University of the Western Cape’s chemistry department have found that fish caught by small-scale commercial fishers in Kalk Bay (a small artisanal fishing harbour near Cape Town) are contaminated by antibiotics, painkillers, antiretro-virals, disinfectants, and industrial chemicals. Species tested included Snoek, Bonita, Hottentot (Cape Bream), and Panga obtained from random daily commercial catches sold at Kalk Bay harbour in late 2017. The report, furthermore, asserts that the presence of pharmacological compounds in fish is due to untreated sewage flowing into the ocean. This is because drugs are not wholly metabolised in the human body and, therefore, end up in the untreated sewage being
arbitrarily deposited into the ocean. Similarly, stormwater is a probable source of pesticide and industrial chemical pollution as the chemicals (compounds) accumulate, not only in fish, but also in the bodies of other marine organisms.

7.3.8. Terrestrial (land) ecosystems
Terrestrial ecosystems are subject to similarly adverse impacts from eutrophication. Increased nitrates in soil are frequently undesirable for plants. Many terrestrial plant species are endangered because of soil eutrophication. Meadows, forests and bogs are characterised by low nutrient content and slowly growing species have adapted to those levels. Due to soil eutrophication these species can be overtaken by faster growing and more competitive species. This can have a knock-on effect insomuch as animals inhabiting such areas generally, and especially niche species inhabiting micro-habitats, can suffer losses or even extinction. Similarly, in meadows, natural species may be lost, being out competed by aggressive grasses that can take advantage of higher nitrogen levels. Species-rich ferns can be overtaken by reed or reed grass species. Forest undergrowth affected by effluent run-off from nearby industry can be turned into a nettle and bramble thicket. Chemical forms of nitrogen are most often of concern with regard to eutrophication, because plants have high nitrogen requirements so that additions of nitrogen compounds will stimulate plant growth. Nitrogen is not readily available in soil because N\textsubscript{2}, a gaseous form of nitrogen, is very stable and unavailable directly to higher plants.

Terrestrial ecosystems rely on microbial nitrogen fixation to convert N\textsubscript{2} into other forms such as nitrates. However, there is a limit to how much nitrogen can be utilised. Ecosystems receiving more nitrogen than the plants require are called nitrogen-saturated. Saturated terrestrial ecosystems then can contribute both inorganic and organic nitrogen to freshwater, coastal and marine eutrophication, where nitrogen is also typically a limiting nutrient (Chislock et al., 2013). This is also the case with increased levels of phosphorous. However, because phosphorous is generally much less soluble than nitrogen, it is leached from the soil at a much slower rate than nitrogen. Consequently, phosphorous is much more important as a limiting nutrient in aquatic systems (Boesch, 2019).

8. Evaluation and discussion
The above-mentioned causes and changes may bring about loss of species independently of, or in concert with, one or more other factors, such as competition for space and food. In many such cases, non-human species are then identified or labeled as the source of threats to livestock or crops and are subsequently persecuted (Brisman & South, 2019). The upshot hereof is that without biodiversity, the stability, strength and interdependence of ecosystems are weakened and crucial processes of, for example photosynthesis, water retention and soil nutrition, are threatened. Consonantly, any one incidence of conservation crime may cause several different types of harm or damage (victimisation), which can affect humans, non-humans, communities, local and global environments as well as future generations. The effects of a single environmental pollution offence may not appear significant, but the cumulative environmental consequences of repeated violations over time (as in the case of SA municipalities) can be considerable (Skinnider, 2011). Moreover, environmental harm, because of its diffuse nature, is difficult to relate to criminal law theories of harm and prejudice. Whereas environmental damage can cause both instantaneous and severe harm, it can, and very often does, also involve small, relatively negligible, incidents, which can have considerable consequences when examining the cumulative effect. Further exacerbating this situation is the fact that it often takes time for the extent and impact of environmental damage to be comprehended and/or become perceptible. Consequently, the injury (victimisation quantum) from each “crime” may be difficult to identify and this makes it challenging, in turn, to distinguish between those actions that cause actual harm and those actions that create potential or risk of harm (Skinnider, 2011).
Although the extent of wastewater pollution in SA, for the most part, has been exposed, it is far more difficult to quantify the scale and scope of the harm emanating from the ongoing water pollution and/or mismanagement predicament. This, coupled with the brouhaha made over conventional crime and criminality, is the crux of the dilemma.

9. Conceptualising environmental victimisation
It has been unequivocally established that waste water mismanagement in South Africa (specifically by municipalities) has become pervasive and monotonous to the virtual point of universality. Since this irreverence is predatory, victimising both the natural environment and human beings, it is deemed necessary, as a sidebar, to clarify this concept existentially. Pollution-related crimes are often regarded as “victimless” as they do not always, in contrast to “conventional” crimes, produce an immediate consequence, and the harm may, as stated previously, be diffused or go undetected for a protracted period of time. For this reason, victims of environmental harm are not widely recognised as victims of crime and are often excluded from the traditional view of victimology, which is largely based on orthodox constructions of crime (Skinnider, 2011). However, conservation crime victims challenge the traditional victimology approach as they are often victimised collectively and can involve non-conventional victims (non-human species, the environment, and future generations).

Conservation crimes and environmental indiscretions (including waste water mismanagement and pollution), like other crimes, are social constructions influenced by power relations in society and reflect society’s views of morally reprehensible conduct (Lynch & Stretsky, 2003). Consequently, fiscal interests play a primary role in determining whether environmental harms will be treated as crimes or infringements, or be accepted and endorsed as “normal”. The unfortunate reality in South Africa is that, far too frequently, waste water mismanagement and associated municipal indiscretions are regarded as commonplace and “to be expected”, by the regulatory authorities and citizenry alike, with its manifestation generally coming to pass apathetically and with the “concurrence” of society (in the sense that victims are not always aware of the fact that they, or the natural environment, are being victimised). From the foregoing it becomes clear that the environment, and affected communities (usually rural communities and informal settlements), are increasingly being preyed upon and victimised by bureaucratic complacency, whilst not being regarded as victims in the ordinary sense of the word. Until there is parity, insomuch as waste water mismanagement and irreverence are viewed with the same moral repugnance as crimes against persons or property, environmental and human victimisation can be expected to continue unabated.

10. Towards potential solutions—recognising the signs
South Africa’s waste water and sewage mismanagement problem clearly infringes South Africans’ section 24 constitutional rights to an environment not harmful to their health or wellbeing, environmental protection, and prevention of pollution and ecological degradation. Sewage treatment plants in poor or critical condition also violate section 19 of the NWA, which declares that anyone who owns, controls, occupies, or uses land for any use that could cause pollution of a water resource must take “all reasonable measures” to prevent said pollution. Further, section 28 of the National Environmental Management Act, 1998 (NEMA) holds every person who may cause pollution or environmental degradation responsible for minimising said pollution.

The fact of the matter is that existing environmental legislation is ineffective at preventing waste water mismanagement and pollution mainly because it is not effectively implemented against local municipalities (a case of one government department being hesitant to prosecute another one). The broad scope of the NEMA provides sufficient justification for government departments to issue compliance notices, but compliance notices only constitute criminal offences when the Minister or MECs of the issuing departments report the matter to the Director of Public prosecutions. The DWA is, in fact, of the opinion that the criminal prosecution of a state organ is not a simple process, and that an “assistive” rather than a “litigative” approach is to be preferred.
when dealing with contraveners (Algotsson et al., 2009; Diemont, 2012; Nkosi & Odeku, 2014). Algotsson et al. (2009) in fact state that while South Africa is seeking to increase cooperation between different spheres of government, there is equally a need for a system that can strengthen oversight in municipalities. Unquestionably the obligation to monitor, if effectively implemented, could lead to an improvement in the delivery of water sanitation services. A persistent worry, however, is whether in practice the national and provincial governments exercise this monitoring function at all or in good faith (Algotsson et al., 2009). The Acting Chief Director of the DWA has in fact acknowledged that compliance management has been neglected and that a number of norms and standards are not enforced, which if done correctly over the years, would have prevented the current state of affairs from occurring (Department of Water Affairs on the state of South Africa's waste water treatment: Briefing, 2010). Consonant herewith, Kings and Wild (2015) assert that despite South Africa’s clear environmental legislation, a lack of implementation and capacity in government ensures that enforcement does not happen, even more so when politically connected entities (such as municipalities) are doing the law breaking. These authors state further that enforcing environmental laws regarding waste water and pollution and imposing fines has only happened a handful of times since 1994, and then only against private industry, not against offending municipalities (the leading polluters in South Africa). Even when an action is considered a criminal offence, as are actions that fail to comply with section 19 of the NWA, the penalties for pollution are usually not harsh enough to serve as deterrents. Although several examples of industries being prosecuted for pollution incidents exist (often mining concerns), no recorded cases of municipalities being criminally prosecuted (by the national or provincial government) for the ongoing mismanagement of waste water and resultant pollution detailed in this article could be traced. This speaks volumes about the (lack of) oversight and enforcement supposedly undertaken by national government.

The following is an example of a concrete case pertaining to a water sanitation/pollution incident: In Federation for Sustainable Environment and Others versus Minister of Water Affairs and Others, case no. (35672/12) (2012) ZAGPPHC 140, the North Gauteng High Court made an administrative order compelling the Gert Sibande Municipality to provide temporary potable water to the residents within its jurisdiction within 72 hours while taking all reasonable steps to permanently make safe the polluted water being distributed (Nkosi & Odeku, 2014). Other water sanitation related cases include: Lasion Properties (Pty) Ltd. versus Wadeville Investment Co. (Pty) Ltd. and Another 1997 (4) SA 578 (W); and Minister of Water Affairs and Forestry versus Stilfontein Gold Mining Company and Others (7655/55, 7655/55) (2006) ZAGPHC 47. In both these cases, guilty verdicts were returned and (corrective) administrative directives in terms of the NWA issued as punishment. A criminal case involving the discharge of sewage into South African coastal waters involving a Ukrainian registered fishing vessel was also recently concluded (26–28 November 2018). The prosecution was instituted by the Department of Environmental Affairs (in terms of the NEMA) and the South African Maritime Safety Authority (SAMSA) and resulted in the accused being sentenced to pay ZAR300 00 (about 20 000 US$) or serve 24 months imprisonment, half of which was suspended for 5 years on condition that the accused is not convicted of contravening certain other environmental law provisions (Nqayi, 2018).

Even though criminal sanctions/penalties are prescribed by legislation, sentences (punishment) are usually administrative in nature and pale in comparison to the environmental and social damage caused—a topic worthy of independent study itself. Conservation crimes are not even specifically classified by the South African Police Service (Herbig & Joubert, 2006) further complicating and hampering traction in this regard. Until sanctions for failure to maintain dilapidated infrastructure systems are costlier than ignoring them, South Africa can expect these abuses to continue. If the national, provincial and municipal government cannot properly direct funds to maintain infrastructure, environmental degradation will worsen, and South Africa will always be at risk of not having sufficient clean water and slowly eroding its natural resource assets. There is unquestionably a clear challenge for these entities to (rapidly) learn how to function within the environmental limits of “acceptable change” and to reinstate ecosystem
vigor and buoyancy (Gore, 2017). Since the recognition of the interconnectedness of species is often absent, it is not always possible to simply reverse a negative occurrence, especially if it has taken place over time, undercutting conservation ideals. Essentially, human acts and omissions are directly and indirectly, separately and synergistically, causing environmental damage on a daily basis.

Humans (especially those wielding legislative power) are the one species with the ability to annihilate all other species (deliberately, irresponsibly, nonchalantly or even fortuitously) and, thus, humans should, not only exercise restraint/constraint with respect to this gargantuan power, but have a duty of stewardship—an obligation not to engage in acts or omissions (of ecocide) that have significant consequences for biodiversity. Enforceable natural resource legislative prescriptions, holding national, provincial, and municipal government honest/accountable, without fear or favour, would, no doubt, be a step in the right direction.

11. Recommendations
Waste water management in South Africa is hampered by a pathological lack of environmental control systems and appropriate implementation of legislation, limited know-how and indiscriminate biological contamination. Policy-makers and principal government service providers are compromising SA’s future by neglecting their oversight role, resulting in government being the largest polluter of water. There is little, if any, equality between the social and environmental harm (victimisation) caused by waste water pollution, and even less appreciation that the environment is akin to an entwined tapestry—removing a loose fibre at one end can deform the scene somewhere else and even lead to the separating of the tapestry in its entirety. There is, therefore, a dire need to invest more inertia in a biocentric ecophilosophical orientation (away from the all too common homocentric, anthropocentric and consumerist dispensations). There needs to be an understanding that it is not just people who are superior and that need protection from environmental harms, but the environment itself—a realisation that nature cannot simply be viewed subsidiarily, as something to be commandeered, expropriated, and expended in a manner which best suits the immediate interests of humans (Schellenberger, 2015).

Platforms and processes for information sharing, dialogue and building trust need to be set up well in advance of serious crises, not during them. If not, South Africa’s waste water management woes will keep slipping under the radar and continue gaining momentum until reparation is no longer possible. South African water provision/management authorities need to support conservationism and environmental protection in various guises in the context of modern industrial society, rectifying issues through beneficial rather than merely remedial actions (Wimberley & Pellegrino, 2014). The elastic law enforcement approach alluded to in this article must be revisited and anachronistic management practices urgently replaced with more eco-pragmatic ones that recognise the delicate interplay between environmental and social dimensions if South Africa’s water pollution crisis is to be mitigated any time soon, or at all. In sum, the transactional distance between government waste water role-players, environmental impact and societal needs must be shortened and informed by sound guidelines and procedures to ensure sustainable and holistic future management.

12. Conclusion
From the preceding elucidation, it becomes clear that waste water (mis)management, in South Africa is predatory as well as an illusory and fraudulent charade. It is dressed-up as realism and utility rather than criminal and wrong, and where bureaucracy and totalitarianism trump ecosystems, biology and social welfare. Government (on all three tiers), seemingly with impunity, ignores the basic laws of ecology as it loiters in the modernist fallacy of nature being an abundance of infinite resources. The muted voice of the environment (as a victim) is, when acknowledged; only recognised as a means to an end, little else. No attempts to understand and resolve the complex problems confronting South Africa’s waste water mismanagement phenomenon will be adequate,
holistic or sustainable if detached from accountable governance and an appreciation of the enjoined character of environmental and social/community dynamics.

It is clear that the legal structure for cooperative governance in the provision of water services provides for strategic gateways towards ensuring that there is sustainable use of water resources and that there is efficiency in the provision of water services. What is undeniably equally evident is that when it comes to hands-on execution, there is no obvious collaboration between the different spheres of government, especially the national government and municipalities in those areas where the former must set norms and standards that buttress and guide water services delivery. The time has come to deal with regulatory violations decisively and effectively. There is a pressing need to monitor local authorities in respect of waste water management and for both water services authorities and society to report criminal offences to the South African Police Service. The deterrent effect of a few impact prosecutions could increase the likelihood of enhanced water service delivery in all its forms.

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Summary of key research activities (DR. FJW Herbig)
Key research activities are directed towards the evaluation and interpretation of various forms of conservation crime (also sometimes referred to as environmental crime), determining its trends and transitions as well as the ramifications thereof in an existential and criminological context. My research attempts to capture the inter-subjective, inter-generational and/or inter-ecosystemic processes which combine to produce scenarios of environmental harm (to natural resources and humans). Specific emphasis is also placed on conservation crime semantics and the synthesis of natural resource crime and criminality phraseology in order to promote the prudence of the conservation crime dialectic. This article buttresses and cascades onto the journal articles and book chapters I have already published in the conservation crime arena and adds to the body of knowledge being generated within the conservation crime remit, both nationally and internationally.

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