1.0 PURPOSE
1.1 The purpose of this paper is to request the Council to recognise the unsustainable exploitation of many of our rivers and streams; and, to initiate a policy of the phasing out of commercial extraction of rock, gravel and sand from rivers in favour of the establishment of a regional network of hard rock quarries.

2.0 BACKGROUND
2.1 Fiji’s rivers and creeks are a little recognised resource of great subsistence and sustenance value for the traditional Fijian way of life and the majority of rural dwellers. They are also of considerable biodiversity interest, the recognition of which has only come about in the last few years. Increasingly, however, the greatest perceived value is as a source of gravel and rocks for the construction industry and consequent “gravel rental” or lease rights for adjacent landowners.

2.2 The very rapid and unsustainable manner in which gravel and boulders are being extracted is causing major ecological changes in many of Fiji’s rivers and streams, and major hydraulic changes, the economic impacts of which are beginning to be felt in the form of increased and more extreme flooding, increased dredging needs, and the undermining of the foundations of bridges, Irish crossings, river walls, culverts etc. The economic costs to the nation of increased severe flooding, increased dredging and the replacement of riverine infrastructure will be enormous, and will be paid for by taxpayers, and not the extractors of gravel and boulders.

2.3 Fiji is blessed with abundant resources of good quality rock whose exploitation has no sustainability issues and, if undertaken professionally, minimal environmental impact. There is an urgent need for the extraction of gravel and boulders to be brought under control and undertaken only at sustainable levels, with the bulk of the need being sourced from quarries.

3.0 ISSUES AND DISCUSSION
3.1 Traditional Values of Rivers and Streams
Unpolluted rivers and streams have traditionally been an essential component of traditional rural lifestyles. Wild pig apart, rivers and streams have in the past provided the bulk of dietary protein for the vast majority of inland Fijians in the form of fish, prawns and eels, all of which were essential dietary items. The loss of these is a major detriment to rural lifestyles. Similarly a constant supply of clean water has been an expectation of rural living and one of the important determinants in the location of villages. Rivers and streams have always provided drinking water but have also been important for washing and bathing, as well as for livestock needs.
3.2 Biodiversity Values

Until very recently, it was believed that Fiji’s freshwater biodiversity was limited and uninteresting with no, or minimal, endemism. However, in the last five years research has shown that this assumption is very wrong. Around 143 species are known that spend at least half of their lives in freshwater. Of these about 122 are spending the bulk of their adult lives in freshwater (the other 21 species are spending the bulk of their sub-adult lives in freshwater). 132 of these are native species and 11 species are known well established populations of introduced fishes. There are at least 10 endemic species of Fijian fishes that inhabit freshwater systems for much of their lives. There are at least five species that could be considered endangered.

3.3 Construction Values

River sand, aggregate and rocks have become a very common and cheap source of material for Fiji’s construction and road building industries, indeed they have fuelled the construction industry for the past half century. With NLTB providing “gravel rental”, lease rights or Open Licenses to commercial operators in exchange for fees, landowners adjacent to rivers have enjoyed cash windfalls for materials which are legally state rather than native land property (refer Legislation below).

3.4 Effects/Impacts

Rock, gravel and sand production is a natural process in every catchment system and there is a sustainable level of extraction at which little or no impact arises. However, exceeding that extraction can lead to major impacts and these are all too clearly seen in many if not most rivers near Fiji’s urban centres. Removing boulders and rocks dramatically changes the hydraulic characteristics of a river – generally Fiji’s rivers, in their natural state, are a mixture of quiet pools or stretches of slow moving water, interspersed with whitewater rapids of variable length and water velocity. This is the natural order of rivers and Fiji’s native biodiversity are adapted to this alternating river passage and habitats. Excessive extraction of river material eliminates habitat differentiation (pools and rapids) and the river takes on the characteristics of a smooth, culvert with a lowered river base course. This has the following consequences:

1. Different river habitats are lost (pools, rapids, stretches etc.) with disastrous consequences for Fijian aquatic fauna i.e. loss or a great reduction in prawns and Ika Droka;
2. With the river reduced to a ‘culvert-like’ condition, floods are not ‘held up’ by a varied river topography, and so proceed down the catchment at a much faster rate. If this coincides with a hide or rising tide, then much larger floods are experienced at the river mouth. This is what has been happening increasingly in Nadi over the past two decades and occurred at Labasa during Cyclone Ami. Mistakenly attributed to ‘climate change’ increased flooding for many of Fiji’s rivers is something which is entirely of our own making;
3. Fine gravel, sand and silt are delivered much faster to the mouth of the river where they settle out and impede navigation and may increase flooding. Costly dredging is required more frequently to mitigate these effects; and,
4. Lowering the base course of rivers, undermines those structure which were built when the rivers were at a higher level i.e. bridges, Irish crossings, culverts, irrigation off takes, and river and flood protection walls. Undermining such structures means that they will not withstand the design forces they were built for and will sooner or later have to be replaced.
The first of these impacts effects biodiversity values, but very importantly the ability of subsistence dwellers to obtain a major portion of their dietary protein and to enjoy an unaffected rural lifestyle to which they are accustomed.

The last three of these impacts pose significant risk and financial implications for downstream dwellers, and major financial implications for the state, which will ultimately be borne by the taxpayers. The current generation, in particular the construction and tourism industries, are mining a resource at very little cost to themselves, the detriment of which will be felt by future generations.

That the state allows the on-going extraction and the ruining of the nation’s rivers, without any consideration of the financial or social implications is a classic example of unsustainable resource management.

Removal of large boulders and rocks from the upper stretches of river beds can be especially damaging. This has occurred to exhaustion on the Sabeto river. Much of these rocks went to the Denarau Resort, the Sonaisali Resorts and the Wailoaloa Fantasy developments — the irrational issue here is that angular quarried rock is much superior as an engineering material than rounded boulder rock for the armouring of sea walls which means that the use at these resorts is purely decorative. Alternative decorative use for large rocks was used at the Outrigger, the Momi Resort and is currently being used on large scale at the Naisoso Resort.

3.5 Nadi River Flood Retention Dams Project
Currently, Ministry of Primary Industry’s Department of Land & Water Resources Management is undertaking a multi-million project to reduce flood hazard to the lower Nadi through the construction of 12 flood-retention dams. The function of these dams is to reduce major flooding in the lower catchment by holding-up floodwaters behind dams and releasing the water gradually. These dams, being constructed at great cost to the taxpayer, simply try to mimic the original condition of the river before the decades of removal of rock and gravel had reduced it to a culvert-like condition. This is the epitome of unsustainable development of a natural resource.

3.6 Existing Legislation and Administration
The NLTB provides Open Licenses without any environmental or management requirements at all, and any issuance of licenses by the NLTB would appear to contravene the Rivers and Streams Act (Cap. 136), which quite clearly states (section 5) that “all streams……with the bed thereof belong to the Crown……….”.

The Quarries Act applies to: "every excavation and place (not being a mine) in which persons work at the removal of rock, earth, clay, sand, soil, gravel, limestone or ……". Mineral Resources Department have stated that they favour the establishment of Regional Hard Rock Quarries rather than rivers to source the nation’s need for rock and aggregate. However, gravel extraction is currently permitted by NLTB and other agencies without any control by the rightful regulatory authorities, the Mineral Resources Department and the Lands Department.

Public Works Department’s Codes of Environmental Practice ‘Road Design, Construction and Maintenance’ cover river gravel extraction in appropriate detail. Codes, 1,2,3,6,8,9 are relevant COEPs in this respect with COEP 9 - Gravel Extraction devoted entirely to this issue. However, these codes are not used at all by PWD.

3.7 Environment Management Act 2005
Rivers feature prominently in the Environment Management Act. Under the Act, rivers are identified as one of the “matters of national importance”, the identification of which is one of two
“purposes” of the Act itself, the other being the application of principles of “sustainable use and development of natural resources” (section 3) – Application & Purposes.

Rivers are identified twice in Schedule 2 (Part 4: EIA - section 27) as components of development proposals requiring EIAs to be approved by the EIA Administrator.

- (j) a proposal that could alter rivers or creeks;
- (r) a proposal that involves dredging or excavating a river bed;

4.0 DECISION

4.1 The National Environment Council is invited to recognise the serious negative effects and impacts of the current widespread, unsustainable use of river rock and gravel.

4.2 The National Environment Council is invited to consider and approve the need for any exploitation of river rock and gravel to provide an a priori demonstration of its sustainability in line with the requirements of the Environmental Management Act 2005, and be administered by the rightful regulatory authorities.

4.3 In line with the “purpose” and as an “application of principle” of the Environmental Management Act 2005, the National Environment Council is invited to adopt a policy for the appropriate regulatory authorities of phasing out all commercial extraction of river gravel, sand and rock in favour of the establishment of regional hard rock quarries.

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1 By specifying “commercial use”, the small-scale, self-help needs of villagers and rural communities is safeguarded.