BACKGROUND PAPER
DEEP SEA MINING

DRAFT TERMS OF REFERENCE
1. Small Pacific Island Countries (SPICs)\(^1\) face unique development challenges due to their economic geography. Deep Sea Mining (DSM) is one emerging, potential industry that offers transformative impacts. But, large scale mining has a long and mixed history in terms of development outcomes, and resource-rich/resource-dependent nations in particular have struggled to leverage natural resource development towards broader economic diversification and sustained growth. Resource development undertaken today will impact a nation for generations to come, and the need for good sector governance, strong institutions and highly skilled professionals to develop and implement sound policies, laws and regulatory frameworks is paramount to deriving lasting benefits.

2. To assist resource-rich and resource-dependent nations, the World Bank has defined good sector governance as having three important dimensions (a) ensure appropriate and adequate content of policies, laws and regulations to manage the varied demands and impacts associated with the sector, (b) create the capacity for effective development, implementation, monitoring and enforcement of rules that ensure effective monitoring and enforcement of policies, laws and regulations; and (c) clarify roles and responsibilities of decision-makers and ensure accountability through transparent and non-discretionary processes that are inclusive of a broad set of stakeholder views and reinforced by codes of acceptable conduct.

3. With this understanding, the Pacific Possible Study is a set of diagnostic activities to identify opportunities and guide SPICs towards sustained economic development. Two core elements of the Pacific Possible Study relate to Deep Sea Mining. Through these, we aim to: (a) identify the sector policies, laws and regulations that countries would want to consider if they choose to try and harness the resources that lie within their exclusive economic zones (EEZs) in order to support poverty reduction and shared prosperity from production of seabed resources, whilst ensuring that possible environmental and social impacts are mitigated, and (b) provide a realistic assessment of the DSM opportunity and quantify potential increases in per capita GNP and government revenue by 2040 as a result of resource production.

4. Global development remains reliant on increasingly intensive use of mineral resources, and the extractive industries form a broad base of the global GDP. However, efficient resource management and use is a history based on experience gained from mining activities in the terrestrial environment. The financial and economic models that underpin our understanding of resource development reflect lessons learned across millennia on a relatively small portion of the earth’s crust. The unique challenge of DSM is that there is no prior history to guide the formation of good-practice policies, laws and regulations – neither within developed or developing nations worldwide. Given DSM is a new activity, there is limited understanding regarding the appropriate policies, laws and regulations; and associated fiscal, environmental and social frameworks for DSM. While many of the existing frameworks for land-based mining could / will be adapted to the marine environment, there is need to proceed in measured steps guided by a reassessment of the risks and underlying assumptions that form understanding today. For the

\(^1\) SPIC nations: Palau, Federated States of Micronesia, Marshall Islands, Kiribati, Solomon Islands, Vanuatu, Fiji, Tonga, Samoa, and Tuvalu.
World Bank to provide policy guidance, there is need to first internally assess core issues, the associated impacts, and thereafter to arrive at policy options that would enable environmental sustainability, social benefits, and economic returns. It is important to state that the background paper on Deep Sea Mining will not advocate for countries to pursue this possible growth option, but represents a stocktaking exercise to help frame the debate and outline the key governance, institutional, regulatory, fiscal and legal frameworks that would need to be in place for countries to be able to consider these possibilities.

**DEEP SEA MINING**

5. By definition DSM occurs in the deeper-water parts of the ocean, where minerals are deposited on the surface of the seabed or within the sub-soil by natural processes. Deeper-water parts of the ocean are generally considered as areas below the photic zone, deeper than 400 metres (and up to 6,000 m depth), beyond reefs and traditional fishing grounds, where hydrostatic pressures require specialized equipment. There are different types of DSM deposits, but most commonly reported are iron-manganese (or ferromanganese) nodules and crusts, massive sulphides, phosphates, and metalliferous sediments; but even these resources are poorly understood and new deposit types should be expected as the science improves.

6. To date, marine mining has been confined to extensions of onshore mineral deposits followed out to sea and shallow water dredging operations focused on beach sands and coastal shelves containing valuable minerals. No system has yet been developed to enable the operation of commercial mining in the deeper parts of the oceans. A principal impediment to DSM has been the availability of proven deep water mining technology given the capital and operating costs, coupled with untested administrative / institutional / regulatory systems.

7. While DSM has been actively pursued since the 1970’s to varying degrees, the 2008 – 2013 commodity super-cycle catalyzed new interest by financiers and mining companies to back ventures, and this has advanced application of (pre-) commercial-scale technologies. As such, technological breakthroughs towards commercial DSM should be expected; most likely in the more prospective waters of Papua New Guinea, Tonga, Solomon Islands, Fiji, Vanuatu, New Zealand and Japan. Several governments, are also supporting detailed geodetic / geological surveys to assess mineral resource endowments, seeking to understand the commercial viability of these resources viz. ongoing investor interest and current supply / demand trends. These programs will yield a first descriptor of the inventory of potentially recoverable minerals using current technologies and prevailing prices (the gross value, in-situ). Core to understanding the financial and economic potential of DSM is to deduct from the in-situ value capital and operating costs, repayment of capital and interest, and the associated time-value adjusted impacts of meeting full contractual and regulatory compliance necessary to keep a license holding in good standing.

8. As such, while there have been quantitative descriptors of DSM potential, quantitative estimates of the potential, in-situ resource value remain less commonly reported. And, the resulting economic / financial as well as social and environmental impact of DSM in any one jurisdiction remains largely undefined. Nonetheless, indicative estimates are useful in framing the quantum of development potential and a recent study commissioned by the Government of Cook Islands reported that the in situ value of manganese nodules within its jurisdiction to the north of the island chain at US$146 billion.²

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9. The term DSM is widely used to describe three principal phases of activity, but this broad use of terminology has at times led to much misinformation as to what is happening at great depths today:

(i) **prospecting** -- the search for DSM deposits within designated license and/or national areas including estimation of the composition, size and distribution of deposits of DSM and their economic values, without any exclusive rights;

(ii) **exploration** -- searching for deposits of DSM (either in the Area or within national jurisdiction) with exclusive rights; and the analysis of such deposits, the use and testing of recovery systems and equipment, processing facilities and transportation systems, and the carrying out of studies for the environmental, social, technical, economic, commercial and other appropriate factors that must be taken into account in exploitation; and

(iii) **exploitation** - the recovery for commercial purposes of DSM from the seabed (either in the Area or within national jurisdiction), and the extraction of minerals, including the construction and operation of mining, processing and transportation systems, for the production and marketing of metals.

10. The UN Convention on the Law of the Sea gives coastal States sovereign rights over mineral deposits within their national maritime jurisdiction. The same Convention prescribes that this national maritime jurisdiction can be up to 200 (or in some instances 350) nautical miles from the country’s coastal baseline. For archipelagic States, the coastal baseline can itself be measured around the island grouping – giving vast maritime jurisdiction to tiny land masses – for example, the Cook Islands, a country of 15 islands comprising just 200km$^2$, has a national maritime jurisdiction of around 2 million km$^2$.

11. There is emerging investment in the deep seabed (at 1,000-6,000m depths) within Pacific Islands’ national marine jurisdiction. Hundreds of DSM exploration licenses have been issued over the past 5 years in the Pacific (with more than 1.5 million km$^2$ of the seafloor currently under exploration license). Industry watchers predict DSM mining is expected to commence within the next 5 years.

12. Four Pacific Island States have applied to hold or sponsor DSM exploration contracts in ‘the Area’ (the seabed beyond national jurisdiction, managed by the International Seabed Authority) – the first developing States to do so. Other Pacific Islands have expressed interest to do likewise. These Pacific Island governments face a complex array of technical challenges. Appropriate fiscal regimes to deliver equitable Government ‘take’, steps to manage those funds sustainably, and understanding of environmental impacts and the appropriate regulatory regimes remain untested. Moreover, social considerations, most often paramount to sustainable terrestrial mining operations, largely remain unaddressed.

13. Recognizing the impending development of DSM, various donor agencies have begun a first-phase of introductory assistance:

(i) **The Commonwealth Secretariat** - has provided some legal and economic policy advice on DSM, particularly via the Head of its Economic and Legal Section (ELS), who drafted the Cook Islands Seabed Minerals Act 2009 (in a previous role as ELS Advisor).

(ii) **The International Monetary Fund (IMF)** - through its regional Pacific Financial Technical Assistance Centre (based in Suva, Fiji) has provided assistance to Tonga and Cook Islands on (i) developing a fiscal policy for raising DSM revenue, and (ii) drafting relevant taxation and royalty regime laws.

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3 More information is needed regarding the world’s first DSM mining lease, granted in 2011 by Papua New Guinea in the South Pacific Bismarck Sea.
14. Common to the above noted assistance is a reported (a) significant capacity deficiency on collection and dissemination of geological data and mineral resource information; (b) DSM national policies and laws that vary from one nation to the next and remain largely untested; (c) fiscal frameworks for DSM that are either direct extensions or derivatives of terrestrial mining frameworks, whose risk profiles and underlying assumptions are materially different, (d) weak understanding of the appropriate environmental framework given the deep marine environment, (e) near total neglect of the social policies necessary for DSM to ensure adequate / commensurate benefits sharing, and (f) institutional weakness across licensing, regulatory compliance monitoring, and revenues management. Most importantly, the majority of nations for which DSM is a potential industry have no previous experience even in large-scale terrestrial mining sector administration.

SCOPE OF WORK

15. A team of Consultants will (a) assess the potential for DSM in the SPICs both qualitatively and quantitatively, (b) itemize and assess risks associated with DSM, and (c) begin to elaborate appropriate regulatory frameworks for fiscal / environmental / social performance. From this work, the World Bank will conduct a series of internal discussions regarding the appropriate policy positions that would best guide the SPICs in realizing full benefit from DSM, and the safeguard measures to mitigate unwanted outcomes.

17. Consultants will use an existing body of knowledge, to prepare a first generation paper having qualitative and quantitative estimates of DSM potential, and core considerations regarding fiscal / environmental / social regulatory regimes. In particular the report shall (a) summarize the current economic DSM opportunity for SPICs and the broad elements within an appropriate fiscal regime; (b) itemize risks and associated mitigation measures for SPIC governments; and (c) provide an analysis of environmental / social regulatory compliance & fiscal regimes as follows:

Task 1: Quantitative Economic, Environmental and Social Impact Analysis – this Consultant shall update the 2014 resource estimates across the EEZs of the various Pacific Island Countries and associated ISA-administered waters. The consultant shall include ongoing efforts to standardize resource estimates according to the ISA resource classification system for polymetallic minerals. As a part of this task, the Consultant shall reach out to:

- The Economic Commission for Europe, Committee on Sustainable Energy, Expert Group on Resource Classification (UNFC 2009) to learn of potential adoption of the framework for DSM resource classification.
- The Committee for Mineral Reserves International Reporting Standards, CRIRSCO, regarding CRIRSCO International Reporting Template and its Application to Classification and Reporting of Polymetallic Seabed Nodules.

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4 As reported in Deep Sea Mining across the Federation of Micronesian States, with a country-by-country evaluation of policy, legal and regulatory deficiencies, World Bank 2014.
Additionally, to provide contextual understanding regarding the varying resource estimate quantities, the consultant shall review the recent New Zealand application / rejection for an Exploitation Right and the concurrent regulatory developments in the Cook Islands (and other recent DSM developments), in order to prepare a case study summarizing:

a) the quantitative revenue and economic impacts associated with the proposed development
b) the capital and operating costs reported, and associated resource rent
c) the environmental and social impact assessment and other bankable feasibility documents submitted and/or in the public domain
d) a list of core regulatory concerns and deficiencies identified by the regulatory agency

The stand-alone deliverable for Task 1 shall be a report (20-25 pages in length) summarizing points (a) – (d) above. Consultant shall deliver the first draft of the report to the Task Team Leader for review by 30 August. Consultant shall deliver the final version of the report for integration into the overall DSM document by 15 September. Additionally, Consultant shall prepare a slide deck having 4-6 slides summarizing salient findings.

Task 2: Model Fiscal Regime – this Consultant shall build upon the above noted work for DSM fiscal regimes in order to:

a. Work with World Bank fiscal regime specialists to identify where the underlying assumptions and risks for DSM are materially different from terrestrial mining; and thus where / how that difference would be reflected within a model DSM fiscal regime.
b. Test assumptions using a simple financial model and working collaboratively with the Consultant of Task 1 (on associated investment and operating costs)
c. Summarize salient findings in a model fiscal regime framework
d. Prepare a 20-25 page report and 4-6 page executive summary on fiscal regime fundamentals for DSM, including some takeaway messages regarding key terms & conditions of tax policy, institutional and professional skills development for tax / non-tax audit and collection, and a summary of good practice measures for revenues management.
e. Work with the editor on inclusion of this fiscal regime chapter into the overall report
f. Prepare explanatory power point slides

The stand-alone deliverable for Task 2 shall be a report (6-8 pages in length) summarizing points (a) – (d) above. Consultant shall deliver the first draft of the report to the Task Team Leader for review by 30 August. Consultant shall deliver the final version of the report for integration into the overall DSM document by 15 September. Additionally, Consultant shall prepare a slide deck having 4-6 slides summarizing salient findings.

Task 3: Environmental & Social Regulatory Compliance – starting with the “Pacific-ACP states regional legislative and Regulatory Framework for DSM Exploration and Exploitation” and a World Bank multi-country evaluation of regulatory regimes for terrestrial mining prepared by LEGEN [2013], Consultant shall:

a. Work with WB specialist(s) on comparing and contrasting the good practices for environmental / social regulatory regimes for terrestrial mining and compare & contrast with issues more narrowly associated with DSM
b. Further elaborate on the frameworks for good environmental / social performance of DSM and the core considerations to institutional strengthening and building professional skills.

c. Prepare a 20-25 page report and 4-6 page executive summary outlining the broad thinking around development of a model environmental / social regulatory regime appropriate for DSM, including takeaway messages regarding institutional and professional skills development for safeguard compliance.

d. Work with the editor on inclusion of the environmental / social regulatory regimes chapter into the overall report.

e. Prepare explanatory power point slides.

Task 4: Literature Review, Research and Consolidation of Findings: This consultant shall undertake a literature review using a set of search parameters agreed with the broader consulting team. Consultant shall then undertake a first phase of research regarding gaps in knowledge of DSM issues, the prevailing regional and global marine compacts, and in consideration of the work of the broader consulting team. The Consultant shall have responsibility for the overall report, bringing together the Tasks 1 – 3 and Consultant’s own findings regarding DSM into a readable paper – having detailed chapters for the above three tasks: 

a. Working with the core team, distill from the body of existing reports and power points the key messages for a first engagement with governments

b. Collate and integrate concurrent work on a model DSM fiscal regime, environmental / social regulatory framework, and quantitative economic impact analysis.

c. Assist the TTL in discussions across the group, mapping progress and broader outreach within Extractives

d. Prepare a 4-5 page executive summary

e. Prepare a 20 – 25 page report for discussion at the October meeting of the IMF/World Bank in Lima.

WORLD BANK TASK TEAM LEADERS
The World Bank Task Team Leaders for the work will be Michael Stanley, Sector Lead/ Extractives and Stefanie Sieber, Economist/Environment. The TTLs shall be responsible for convening broader internal conversations within the World Bank regarding (a) the above set of tasks, (b) the steps to internally inform the institution, and (c) reaching common understanding of the risks, good practices, and appropriate frameworks that would lead towards sound DSM policy formulation. This will not be an exercise to inform a client on DSM policy positions, but rather leading towards an October meeting with clients in which the team would apprise SPICs of the above noted findings.