Sustainable Sea Transport for Oceania

Outcomes Record from the Sustainable Sea-Transport Talanoa, 28-30 Nov 2012, USP

1. Purpose of Paper

The Sustainable Sea-Transport Talanoa (SSTT) 2012 was held with the objectives of: a) initiating a conversation between key stakeholders in this emergent field; b) canvassing support for a larger, more formal conference in 2013; and c) identifying the key action areas needed to progress this critical debate. This paper sets out the key findings from the SSTT 2012 and suggests an immediate programme of five work streams. It will be circulated amongst all participants to the SSTT 2012 and other identified stakeholders as the basis for further discussion on achieving collaboration and commitment to a common programme.

2. Background to the SSTT 2012

The SSTT 2012 was hosted by USP on behalf of a wide range of participants from government, NGO and commercial interests including representatives from USP, IUCN, WWF, FIVS, S4S, Econesian Society, Greenheart Project, AusAID, GIZ, SPC, B9 Shipping. Initially conceived as a small stakeholder workshop, interest in the talanoa grew to include a wide range of participants and presenters from Fiji and the Pacific region as well as international guests from around the globe. Many participants from outside the region connected and presented via Skype. The SSTT 2012 looked both forward to the future of Pacific sea-transport in a 'climate change' and fossil-fuel scarce future and to the past, a heritage when Oceanian vessels and peoples voyaged sustainably at will. The SSTT 2012 programme is attached as Appendix 1. Appendix 2 provides a list of the participants.

3. SSTT 2012 Outcomes

There was general agreement at the SSTT 2012 that the event was timely and the issue of sustainable sea transport warranted increased priority, further research, and investigation. It is an area where there is strong potential to achieve profound benefits for Pacific Island communities. Progressing this agenda will require both a long-term programme and collaboration between multiple stakeholders both regionally and internationally. There was strong support from participants to develop the SSTT 2012 into a major conference in 2013. Working from the outcomes from the final talanoa sessions, the conference organisers are now promoting a five-strand work programme as the priority for collective action. All five areas are considered starting points for the development of a long-term integrated programme and are set out in further detail in subsequent sections. Progressing this ambitious agenda will require commitment of time, priority, and funding by multiple

partners. USP is offering to coordinate this network through to a 2014[1] SSTT although it lacks the resources to fully implement this without external assistance. Following circulation of this paper for comment, USP will convene a stakeholder/donor workshop in March 2013 to canvass support, including financial assistance, for this programme.

	Work Stream	Keywords	Themes
1	**Heritage**	Drua, Iconic, Culture, Tradition. Excellence in seafaring and vessel design/construction. Ocean as highway not barrier.	Cultural history, archaeology, traditional revival carving, weaving, navigation, seafaring, voyaging
2	**SSTT 2014**	International Symposium and Drua Festival	Celebrate the Past, Plan for the Future
3	**Strategic Blueprint**	Policy Frameworks Regulatory Frameworks Economic Analysis Quadruple bottom-line reporting Industry-wide Assessment Integrated approach Initial route identification Collaborative relationships	Carbon Credits Cost/Benefit Project v programme Bio and/or Solar and/or Wind Owner/Operator option analysis Private/public Market/Uneconomic
4	**Demonstration Models**	USP Research Vessels	Intra-island - Sustainable Village Vessels (SVV) Inter-island - Greenheart (GH) Barges Fishing vessels Inter-state (B9) Disaster relief
5	**Gender & Youth**	Leadership, Capacity Building, Skill Development, Business Opportunities, Community focus	Training, mentoring, team building

4. The Pacific Shipping Context

Sea-transport is the Pacific's lifeline. For some countries and many communities, especially remote island ones, it the only transport option. It is central to all Oceanic culture and epistemology. The capability to colonise one-third of the globe under sail and without metal is arguably the greatest heritage legacy of Oceanic peoples. The current shipping scenario is unique globally; a region of remote and typically minute transport nodes of minimal economic significance spread over some of the longest communications lines in the world. Transport is the Pacific's largest energy use, consuming 48% of Pacific fossil fuel imports and sea transport is a significant component of this. Alternative energy for sea transport is an emergent technology field of high significance for Oceania. Yet currently this field is almost

[1] USP is offering to host a full conference in early 2014, their 2013 conference programme already being fully committed.

entirely invisible in regional and national policy frameworks, adaptation programmes for climate change or within the growing field of renewable energy technologies.

Domestic and small-scale shipping are the priority areas for Oceania and current options are increasingly unsustainable under a 'Business as Usual' operating scenario. Many of the routes are not economically viable, especially for remote island communities, and must be supported by ever-increasing government subsidies. All options are currently fossil fuel powered and globally the Pacific is the most dependent region on imported fuels, leaving Pacific shipping operators and governments increasingly exposed to fluctuations in price and supply. While some progress has been initiated at the global level by the IMO on programmes to reduce shipping emissions, in particular SOx, the MARPOL Annex 6 regulations on cleaner marine fuel are likely to mean imminent increases on the order of 60% on current prices for some fuels. Fuel already comprises 40-60% of total operating cost for Pacific operators. The domestic transport fleet is characterised by either aging vessels that have in turn replaced old vessels or donated vessels, often also second-hand. Fuel savings are currently only possible through larger and newer vessels; slow-steaming is already employed. This scenario will not change without introduction of new technology and new approaches to sea-transport.

Recent research indicates that alternative energy shipping solutions have potential to deliver immediate benefits to Pacific communities at local, national, and regional levels for a modest research investment. There is a small but growing range of technological solutions either available or imminent. Tackling this issue will require research across a range of disciplines and collaborative input from a range of stakeholders (including government agencies, NGOs, research, and maritime training institutions, regional organisations, shipping, and boat building industry) as well as support and participation of international partners. There is general lack of clean or comprehensive data available across the region to support further investigation.

Alternative powered vessels, whether these be wind, solar, bio-fuel or hybrid, offer the potential for a different shipping scenario. This includes using fleets of multiple smaller vessels: increasing flexibility and reliability of service. There is a range of socio-economic and cultural primary and secondary benefits potentially available from moving to an alternative energy scenario, especially for remote communities, in addition to the obvious fuel saving and environmental benefits. The opportunity for such vessels to be built locally also raises the potential for internalisation within the Pacific of a larger portion of the shipbuilding, maintenance, and other down-stream industries associated with shipping. Multiple vessel fleets of smaller ships would also mean reduced shoreside infrastructure costs.

Much of this knowledge is not new and there are numerable valuable lessons available from past experiments, especially in the last oil crisis. Kirikraft in Kiribati is a key example where pilot programmes by Save the Children, UNDP and FAO in the 1980's has seen a small but stable local boatbuilding industry develop producing local low-cost cargo, passenger and fishing vessels for community use as well as internationally competitive high quality, high tech fibreglass catamarans for the international cruising market. Critical to their learnings are the need to build and develop locally appropriate vessels, capable of been built to

standard at low cost in island conditions, and for the whole of the operation – from build to operation to repair - to be fully supported.

At the inter-island/inter-state level, vessels such as the Greenheart design (220gt, 75dwt, sail/solar hybrid, with 3 x TEU capability) allow potential for cost effective, small container based shipments within and between island countries with the avoidance of expensive trans-shipment via Auckland and Sydney as currently occurs. Such an objective has been a long held priority of many PIC leaders and would open hitherto unattainable routes and strengthen regional partnerships at a practical trade level. This type of technology if combined with sustainable village-based based vessels (SVV), for which there are several designs available, could form the world's first integrated alternative energy fleet. If such technology is adopted at any scale, the potential for offsetting operational costs through carbon credit trading becomes worthy of further investigation. Alternative energy propulsion also presents a strong case for investigation in terms of a range of other maritime applications, e.g. fishing, disaster preparedness/response, research, maritime surveillance.

5. Key themes from SSTT 2012

The SSTT 2012 was a broad ranging discussion. In addition to the summary outlined above, a number of key themes that emerged over the course of the talanoa are particularly worthy of highlighting.

- Oceania's seafaring and ship design/building heritage are extremely strong traditional and cultural icons. Revival of this cultural heritage has now been underway for 40 years. This revival can be considered a 'soft entry point' in garnering local community interest in and recognition of new alternative energy based shipping options, particularly sail based options. There are numerous lessons from Oceania's unique maritime past available for guidance toward the future. The last major conference of Pacific voyagers, researchers, and academics occurred in 1996 at the Auckland Maritime Museum and ultimately led to the Vaka Moana book and exhibition. It can be assumed there would be high interest in re-convening such an event, especially given the widespread and diverse number of voyaging projects currently evident across Oceania.
- Oceania's maritime heritage is extremely diverse. The voyaging revival began in Hawaii in the 1970's and is now visible across the Pacific. The initial emphasis on researching long-distance Polynesian voyaging has tended to over-shadow other aspects of this heritage across Oceania. Of particular interest to the debate on future sea-transport options is the traditional role of ships and shipping in the complex trade networks that developed, especially in central, western, and northern Oceania, which has not received the same attention as that in eastern Oceania. Traditional maritime technologies are still active on a day-to-day basis in parts of Melanesia and Micronesia.
- The global need to move toward carbon neutral or negative technologies is now urgent. Mark Trexler's presentation provided a sobering synopsis of future global scenarios if major reductions in overall GHG emissions are not made immediately. For Oceania, shipping is one area where there is strong potential to achieve reductions for a relatively minimal investment in research and technology.

- The majority of interest and programmes aimed at advancing alternative energy shipping is orientated to developed world needs. There is limited activity focussed on the situation for small island states or developing nation scenarios. Small scale (less than 10,000dwt) and domestic shipping, much of it centred in developing countries, contributes a disproportionate share of the global industries' emissions profile (4% of global cargo but 26% of all shipping emissions or approximately 1% of global totals). Shipping at this scale is excluded under the IMO's EEDI programme.
- A key lesson from European contributors is the strong trend toward research partnerships between universities, governments, and industry networks. Progressing a sustainable sea-transport agenda for Oceania will require a strong research base into the unique issues facing the region, it will need to be multi-disciplinary in nature and alliances between local research providers and those at the cutting edge internationally need to be fostered as an early priority. There is strong interest from the international community that participated, in particular European agencies, in the situation here in Oceania and the SSTT 2012 has already led to initial discussions on future collaboration between USP, UK, and Australian universities.
- There is a need to be cognisant of and take heed of the lessons learnt from past experiments. New technology and approaches need to be specific and appropriate to the varying Pacific settings in which they will be employed. The presentations from Mike Savins in Kiribati were particularly illuminating. There is a history of well intentioned but ultimately unsuccessful projects to introduce and donate alterative technologies, particularly small sailing vessels.
- The issue is far broader than the technology. Economic analysis at both the macro and micro levels is a critical priority as are consideration and understanding of the various socio-economic and socio-cultural factors. Policy and regulatory frameworks at both regional and national levels need to be assessed. Given that shipping has yet to make the 'cut' in terms of identified climate change adaptation and related policy and frameworks of Pacific Island countries, regional and bi-lateral agencies, there is a priority need to now review such forward planning to ensure the current invisibility of shipping and potential for renewables in this field is now reversed. Theoretical research must be balanced with the implementation of real world trialling of practical demonstration models. There is sufficient background research and design now completed to justify moving to practical implementation. Barriers to future development in this sector appear as much perceptual as actual. There is no compelling reason why the Pacific should not be a proving ground in this emerging field, a point made by a number of international commentators.
- For full benefit from a sustainable sea transport agenda for Oceania to be realised, the programme needs to be driven from within the region. From a practical viewpoint Fiji presents as the logical catalytic regional hub due to its geo-physical location, size, scale, infrastructure and current roles as a regional transhipment centre.

Progressing this agenda will require an integrated approach between multiple stakeholders. An agreed framework for achieving collaboration across a broad range of stakeholders in what may be a competitive field is needed. This paper is offered as a starting point for

discussion. Transparent relationship building and open sharing of intelligence and data to the extent possible are critical keys to future success. At an international level there is progress to forming an "International Windship Association" currently being led by European stakeholders. Such an association would offer an entry point for Oceania interests to access support and partnerships with the emerging global industry.

6. Work Stream Priorities

This paper presents a five-strand work stream programme of immediate research priorities needed to progress the broader agenda. Embedded within each are a range of suggested sub-topics. Each work stream is outlined below.

6.1 Work Stream 1 – Heritage

As discussed above, the history of Oceanic peoples is testament of their strong relationship and identification with the sea and they own a heritage legacy that saw Pacific peoples colonise all islands in the world's largest ocean in planned voyages aboard a fleet of diverse blue water ships of revolutionary design and with advanced understanding of aero and hydrodynamics. Pacific shipping in this era was all indigenously designed owned and operated and arguably fully sustainable. The linkage between understanding of this heritage legacy and modern sustainable shipping options is two-fold. Firstly there are innumerable lessons from the past of relevance to future applications, both in terms of vessels and technology but also in regard to the socio-cultural and socio-economic discourses around trade and connections underpinned by prowess in voyaging and shipbuilding. Secondly, the acute cultural pride of Oceanic peoples of this legacy provides an entry point for public education and acceptance of alternative shipping technologies, in particular wind-powered options.

Eastern Polynesian voyaging culture has been extensively documented and researched over the past 40-odd years and the priority for research now must be closer examination of Central Oceania, Melanesian and Micronesian sailing and trading cultures. Over the past 3 years collaboration between FIVS, OCACPS, and USP has seen the scattered written record of Drua culture in Fiji assembled and important work begun on collating the remaining culturally held record. There are strong seafaring connections between Fiji, Tonga, Samoa, and the other islands of central Oceania. Similarly collaboration between a number of stakeholders has seen work progress on documenting and retaining Vanuatu records. There are various initiatives underway in other parts of Melanesia, Micronesia and the various Polynesian 'outliers'.

OCACPS, as the UNESCO dedicated 'Pacific Heritage Hub', would appear the logical coordinating body for a collaborative programme of research and revival. It is proposed that the Sustainable Sea-Transport Talanoa 2014 (see work stream 2) comprise two overlapping events; a celebration of Oceanic seafaring cultures that overlays a formal conference on future directions for sustainable shipping and with OCACPS taking the lead in coordinating the former event. There appears an obvious case for establishing an Oceanic maritime cultural centre under OCACPS as a longer term objective. Such a centre would be a practical learning environment for building and operating traditional craft and a range of related heritage skills such as carving, weaving, sail and rope making, traditional way-finding,

weather prediction, etc. as well as a theoretical centre for researching and developing Oceanic histories and epistemologies of the relationship of peoples and Ocean. Shorter-term priorities include construction of working drua (also called kalia in Tonga and 'alia in Samoa), expansion of the current Fiji research programme to include archaeological and cultural heritage research in Fiji and the wider central Oceania catchment. There is common heritage in the design of the Oceanic lateen sail or *laca* that connects much of central Oceania with Micronesia and a connected legacy in hull design that connects central Oceania with Melanesia. Following these connections while embracing the existing strong connections between the various Polynesian voyaging societies and programmes would see a more holistic and balanced approach to a Pacific seafaring renaissance.

6.2 Work Stream 2 – Sustainable Sea Transport Talanoa 2014

The interest shown in the SSTT 2012 and the broad range of participants from across the globe provides strong evidence of the need to expand on this initial gathering for 2014. A 'double-header' event is suggested with two overlapping focal points of past and future. The former needs to be more than an academic affair, rather a celebration of Oceania's proud seafaring heritage that brings together artisans, craftspeople, sailors, and navigators with related academic disciplines such as history, archaeology, and Pacific Studies. It should be held as much outdoors and on the water as in front of a PPT screen, with adzes and *voivoi* as prevalent as laptops. The 'future' conference will be an expansion of the SSTT 2012 into a more formal, call for papers, and published proceedings. It needs to bring the same mix of disciplines evident at the SSTT 2012 and as wide as possible representation from both local and global participants.

The initial priority is to initiate the conference planning, prepare a draft programme, confirm participation of original collaborating partners and SSTT 2012 participants and new entrants and secure funding and sponsorship.

6.3 Work Stream 3 – A Research Blueprint

There are innumerable research needs to support further development of a sustainable shipping agenda for Oceania as alluded to above. Development of an overall research blueprint appears sensible to allow a coordinated approach to be taken and to avoid duplication of effort between multiple research initiatives. Seven key priority areas such a blueprint needs to include are identified:

- **Economic analysis**. This needs to be both macro and micro focussed and include attention to cost/benefit analysis of both local representative examples and nation to regional assessment. The potential for carbon trading to play a role needs to be scoped.
- **Policy frameworks**. Sustainable shipping is currently invisible within policy frameworks at both regional and national levels and within development, infrastructure, and climate change adaption strategies of any national, regional, or bi-lateral agency.
- **Whole of industry approach**. Most research to date has focussed on the benefits and challenges to using alternative energy powered vessels commercially. But operating the shipping is only one part of the picture and to be effective the issue must be looked at across the sector, including shipbuilding, maintenance, secondary industries, etc.

Nor is it sufficient to focus only on the technology of the vessels. Issues of ownership, management, and operation are critically important; especially for small scale shipping that is aimed at meeting community need and will assumedly be community managed. Whether at local, sub-national, or national level similar questions must be answered. For example, should vessels be private or publicly owned? managed? operated?

- **Quadruple bottom line reporting**. While the economic analysis is an absolute must, there are clearly a range of benefits accruable from any successful application to sustainable shipping. A framework for assessing risk and benefit across social, cultural and environmental baselines as well as economic is needed. This is particularly important for assessing secondary and tertiary benefits.

- **Regulatory frameworks**. Operating alternative technology vessels will require examination of current regulatory frameworks including vessel surveying, training, and qualifications of operators, etc to determine current appropriateness and recommend necessary changes.

- **Identification and characterising key pilot routes/locations/applications**. As discussed above, domestic and small-scale shipping is the area of greatest need currently identified. It is important that the initial routes/locations for testing practical demonstrations of application of new technology are supported to the greatest extent by in-depth research as to current options and history, physical characteristics (e.g. size of catchments, wind/weather routing information, nature, and type of target markets/uses, appropriateness of selected alternative technology, etc. In addition there is a range of applications additional to small scale shipping that have potential for use of alternative energy technologies. These include larger scale shipping, fishing vessels, research vessels, disaster relief/preparedness, etc.

- **Relationships, reporting and information dissemination.** Collaboration and integration between stakeholders across the breadth of the debate is essential. Quality data is needed as is honest, transparent reporting of successes and failures. There is of course limited funding opportunities to support this blueprint and the experiences of other research sectors suggests there is strong potential in an emergent field such as this for vested interest and competiveness to predominate. Development of a stakeholder code of practice is a suggested starting point.

6.4 Work Stream 4 – Practical Demonstration Models

Concurrent with developing a research blueprint for this sector is the need to get working demonstration models operational on the water. There is always a danger with any emerging technology to remain fixated on deskbound research before moving to a practical demonstration basis. In terms of alternative energy transport, there is sufficient design and preliminary research now available to justify moving to development of practical demonstration models.

USP is proposing to seek funding and sector collaboration to undertake a comprehensive 6-year programme to trial the integrated network of SVV and Greenheart type designs referred to above on 3 selected routes in Fiji. The programme is divided into three phases; a 1-year scoping and design phase, a 3-year research phase where USP would operate the

vessels under a controlled methodology and a third 2-year phase where the ownership and operation of the vessels would be transferred to identified community or stakeholder commercial organisations.

This programme would allow a range of parameters to be modelled and trialled in a real world situation covering all aspects of vessel procurement, operation, training, maintenance, and management. The programme would be of sufficient scale to allow collation of sufficient data to demonstrate economic viability, socio-cultural impacts, and benefits and also allow modelling for wider industry fuel savings, secondary and tertiary benefits, and the viability of using carbon credits as an economic incentive for change.

The immediate priority is to source funding to cover the initial years scoping and design exercise.

6.5 Work Stream 5 – Gender and Youth

Sea transport is predestined to continue to play a major role in the future of the communities of Oceania. That future will be markedly different today with major changes likely in an increasingly climate change world. Numerous studies point out that women and youth will be disproportionately affected. Women and youth historically played important roles in seafaring in Oceania, including sail making, *magimagi* lashing production as well as as navigators and crew. In more recent time women in particular are hardly involved in sea-transport, this being a global trend. Recent initiatives such as Te Mana o Te Moana voyage have proved that women make excellent and valuable seafarers. The knowledge and experience that these young women have acquired needs to be taken advantage of. There are also small numbers of women who still retain the traditional knowledge of sail making. Whilst the demand for such skills is probably minimal in today's environment, such skills could be utilised, with sails being made of modern materials and potentially offering income generation. This work stream therefore includes elements of skills transfer (from traditional sail weavers and from experienced women seafarers) to the youth, in particular young women. It also involves mentoring of the young women seafarers to build their capacity as leaders, trainers, and educators.

The initial focus is to be on Fiji, Samoa, and Tonga, reflecting the nationalities of the majority of young women seafarers, as demonstrations for other Pacific Countries. Key stakeholders include UNESCO/USP, Girl Guides, Econesian Society, and government departments, as well as funders. A feasibility study needs to be undertaken, leading to development of an initial programme. The issues to be included are identification of skills to be transferred (e.g. navigation, sailing, safety, sail making), development of resources to support skills transfer (e.g. booklets, posters, etc), identification of target beneficiaries (Fiji Girl Guides has already indicated their interest), potential career/business opportunities, and capacity building of young women to become effective leaders through establishment of a mentoring network of experienced older women.

7. Moving Forward

This Paper is now being circulated to all participants to the SSTT 2012 and the organising committee invite comment on all points. We also encourage wider distribution of this draft

paper. Following consideration a further draft will be circulated for endorsement by any participating organisation that might wish to do so.

We also invite all parties to indicate their interest in participating in the proposed SSTT 2014. Any organisation wishing to take an active role in organising or sponsoring the event is invited to contact the USP Research office directly.