



BUILDING AND ENHANCING GEOSPATIAL NETWORKS IN THE PACIFIC ISLANDS

24 – 28 Nov. 2025 | Japan USP-ICT Theatre

USP Laucala Campus | Suva | Fiji

CONFERENCE PROCEEDINGS

Version 1.2 – 2025-11-24



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The Power of Partnerships and Advocacy in Advancing Earth Observation for the Pacific

by Andiswa Mlisa | *The Pacific Community (SPC)*

Abstract ID: 131

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Institutional

Globally, Earth Observation (EO) is rapidly transforming how countries monitor their environments, respond to disasters, and make evidence-based decisions. Yet for many regions—particularly small island developing states (SIDS)—the true value of EO can only be unlocked through strong partnerships and sustained advocacy. This talk explores how collaboration across governments, regional organisations, international agencies, scientific communities and private sector can drive significant progress in EO adoption, especially in the Pacific.

Drawing on lessons from Digital Earth Pacific (DE Pacific) initiative, the presentation highlights how joint investment, shared infrastructure, and coordinated capacity-building efforts enable countries to overcome barriers such as technical skills gaps, data fragmentation, and limited resources. It also examines the crucial role of advocacy in elevating EO within national policy dialogues, climate negotiations, and funding mechanisms.

By showcasing successful examples—from advancing Land Degradation Neutrality efforts, to regional blue carbon mapping of mangroves and seagrass through the MACBLUE project using Digital Earth Pacific—the talk demonstrates how partnerships not only amplify EO's impact but also ensure Pacific-led, sustainable, and equitable use of space-based technologies. The discussion will offer insights into strategies for deepening partnership models, mobilising long-term support, and promoting EO as a public good essential for resilience, development, and island sovereignty.

Ensuring Continuity of Earth Observation Data: Risks, Resilience and Regional Opportunity for the Pacific

by Sebastian Robertson | Birdi

Abstract ID: 130

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Institutionnal

Copernicus Programme

by Tobias Biermann | European Commission Copernicus Earth Observation Service

Abstract ID: 129

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Mapping

Copernicus is the Earth observation component of the European Union's Space programme, looking at our planet and its environment to benefit all European citizens. It offers information services that draw from satellite Earth Observation and in-situ (non-space) data. At the heart of Copernicus is a constellation of satellites – the Sentinels – that make a huge number of daily observations of the Earth ecosystem. The technological prowess of Copernicus, especially in terms of availability and accessibility, has made Copernicus the largest space data provider in the world. The vast majority of data/information delivered by Copernicus is made available and accessible to any citizen, and any organisation around the world on a free, full, and open basis. In light of Copernicus' data policy, access to Copernicus data and information draws increasing interest from various international partners. In this context, the EU seeks reciprocity in the data exchanges for the benefit of Copernicus. Copernicus has been specifically designed to meet user requirements. Six Copernicus services transform this wealth of satellite data into value-added information by processing and analysing the data. The Presentation will in particular highlight the products of two Services, the Climate Change and Emergency Management Service.

Geospatial Measurement of SDG 9.1.1 (Rural Access Index) for Rural Development and Connectivity

by Dr Robin Workman | TRL Limited

Abstract ID: 128

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Mapping

The Rural Access Index (RAI) was defined in 2005 as the proportion of a rural population living within 2 km of an all-season road. Initial measurements of the RAI, obtained through a variety of data collection methods for 64 countries, were published by the World Bank in 2006. In 2016 the RAI definition was adopted as Sustainable Development Goal (SDG) Indicator 9.1.1, requiring regular update of RAI data for the majority of UN countries. With support from the UKAid funded Research for Community Access Partnership (ReCAP), the World Bank developed updated spatial analysis techniques in GIS to measure the RAI, and trials were carried out in 8 ReCAP partner countries. The outcome from these trials raised significant correlation issues. A follow-on status review of the RAI was conducted with ReCAP funding and a clearer way forward identified to accelerate progress with its geographical coverage.

Consequently, research was undertaken by TRL to develop, propose and obtain agreement on a harmonised approach to data collection and measurement of the RAI using geospatial technologies, and scale up implementation of the RAI across UN member countries, starting with a trial of the proposed measurement framework in Sub-Saharan Africa and South Asia. This presentation describes how the measurement approach for the RAI has been revised in order to eradicate inconsistencies in data collection, meet international standards, and provide a clear framework for data validation. It also highlights a GIS map of RAI developed under the project for all countries in the world, using open-source data.

OSGeo Oceania and FOSS4G Status and Updates

by Alex Leith and Greg Lauer | OSGeo Oceania

Abstract ID: 127

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Institutionnal

This session will provide updates on OSGeo Oceania and FOSS4G projects. OSGeo Oceania is a volunteer organisation devoted to growing and enabling the [OpenStreetMap](#) and [Open Source Geospatial](#) communities in Oceania. FOSS4G stands for Free and Open Source Software for Geospatial, a conference series hosted in partnership with OSGeo. FOSS4G brings open source geospatial users, software developers, decision makers and researchers together from around the world.

New Caledonia GIS Club : Collaboration mapping for a sustainable future

by Damien Buisson | Head of GIS and Remote Sensing Service - DINUM - Governemnt of New Caledonia

Abstract ID: 126

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Institutionnal

The presentation introduces the Club de la Géomatique en Nouvelle-Calédonie (CGNC), a network launched in 2016 that brings together public agencies, research institutes, NGOs and private sector companies in New Caledonia.

It outlines the club's mission: to animate the local geomatics ecosystem by identifying shared data- and-use needs, promoting geospatial practices, and enabling joint actions in remote sensing, GIS and territorial management.

The presentation then maps the structure of the ecosystem: eight membership "colleges" (administrations, public establishments, training/research, associations/NGOs, private companies, networks, regional communities, innovation clusters) comprising 38 members as of November 2025.

Key highlights include the club's role as a facilitator of data sharing, technical exchange and capacity-building, and its alignment with sustainable development goals (SDGs) via improved territorial monitoring and decision-making.

The conclusion emphasizes that by strengthening collaboration among stakeholders in the geomatics sector, strengthening infrastructure (data catalogues, metadata, services) and coordinating efforts in mapping and monitoring, the region can better respond to challenges such as land-use change, mining, climate risk and ecosystem management — essentially "mapping for a sustainable future"

Digital Earth Pacific: Enabling Earth Observations At Scale with Geospatial Foundational Models

by Sachindra Singh | Pacific Community (SPC)

Abstract ID: 125

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Remote Sensing data and software

Geospatial Foundation Models (GeoFMs) are a subset of AI foundation models that focus on explicit representations of spatial primitives such as spatial interaction, spatial stationarity, spatial heterogeneity, and so forth, and encode rich information about places and regions. A combination of multi-sensor data fusion, climate data and analysis ready pre-processing. Foundation models depend on collections of data curated by major space agencies. This talk will give an update on the R&D explorations by the Digital Earth Pacific team, where EO foundational models are tested to generate products such as land cover and land use, flooding extents, and impact of tropical cyclones, especially where there is limited training data points, which is mostly the case across our Pacific islands and nations.

Designing Data Governance Frameworks for Marine Spatial Planning in the Pacific

by Duncan Hume | The Pacific Community (SPC)

Abstract ID: 124

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Maritime Environment

Across the Pacific Islands, Marine Spatial Planning (MSP) is advancing alongside efforts to strengthen Integrated Ocean Management (IOM) and develop National Ocean Policies (NOPs). IOM provides the governance framework for coordinating ocean use and protection, while NOPs set national goals that align local, regional, and international commitments on climate, biodiversity, and sustainable development. Within this framework, MSP is a key tool for turning these goals into action. It is an evidence-based, participatory, and multi-sectoral process that integrates spatial, ecological, and socio-economic information—together with traditional and scientific knowledge—to guide decisions, balance competing ocean uses, and track progress towards shared objectives.

The success of MSP depends on reliable spatial, environmental, and socio-economic data, including information on land-sea interactions, supported by monitoring and governance systems that define how information is collected, harmonised, and shared across institutions and scales. Effective MSP data systems must respect diverse authorities and ensure that information is managed with consent, clear custodianship, and agreed rules for validation and access. Shared governance principles—aligned with the FAIR (Findable, Accessible, Interoperable, Reusable) and CARE (Collective Benefit, Authority to Control, Responsibility, Ethics) frameworks—build trust and long-term cooperation, ensuring that traditional and community knowledge remains under local authority while contributing meaningfully to national and regional decision-making.

This presentation, led by the Pacific Community (SPC), will share insights from recent consultations with multiple Pacific Island countries on how to strengthen marine data governance to support effective MSP. It will outline country priorities, examples of successful approaches, and the next steps for co-designing shared governance frameworks, data standards, and services—building on existing national and regional systems. For those working with remote sensing and GIS data, the discussion highlights how clearer governance and interoperability can make regional datasets easier to access, integrate, and apply—and national and local datasets easier to make relevant and usable for evidence-based ocean management.

Climate-Resilient and Management of Aquifer Potential Using Remote Sensing, GIS-Machine Learning in the Nadi Basin, Viti Levu, Fiji

by Malakai Tuinasau Tadulala | Fiji National University

Abstract ID: 123

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Disaster

by Malakai T Tadulala¹, Satyanarayan N Shashtri ², Joeli Varo², Nichollas Rollings¹, Ulukalesi B Tamata¹, Todd E Dennis¹/¹College of Engineering, Technical Vocational Education Training (CETVET), Fiji National University, Derrick Campus, Fiji / ²School of Business, Engineering, and Land Management, Laucala Campus, The University of the South Pacific. Suva, Fiji.

Theme - Disaster Risk Management

Abstract

Introduction

For any Disaster preparation, water security is the most critical focus for climate-water adaptation, with a primary emphasis on identifying low-cost technologies and tailored solutions as proactive measures. Specifically address the water scarcity faced by marginalised communities and settlements scattered throughout the Nadi Basin (730 km²) in Viti Levu, Fiji, following the post-disaster period.

Materials and Methods

The paradigm shifts from conventional to remote-sensed raster to vector datasets geo-processing, by weaving together mixed methods and methodologies from traditional and new approaches, including semi-paid cloud platforms, web-based Google Earth Engine (GEE), and machine learning. Namely, Visual Basic scripting, along with a collection of several remotely sensed maps, forms the baseline geospatial data using ArcGIS Pro 3.20 for tailored raster and vector fields ready for further geoprocessing. Using bivariate, multivariate analysis, and artificial intelligence geostatistical processes to create 18 distinct thematic layers. Specifically, the Frequency Ratio (FR), Analytical Hierarchy Process (AHP),

and Artificial Neural Network (ANN) said that geostatistical models made a significant difference. The ANN perceptron kappa, a QGIS plugin, geospatially predicted Land Use and Land Cover (LULC) using 70% of the trained data versus 30% of the validated data from LULC GEE datasets to understand the behavioural patterns of water users in 2016, 2023, and 2026. The geospatial model proved that aquifer potential was delineated according to 18 groundwater related thematic layers, respectively, shows promising results, from high to moderate (0.52%), moderate (70.50%), localised to moderate (27.02%) and low to negligible (1.96%) groundwater potential zone area (GWZPA) reserved for the climate resilient communities of the Nadi Basin.

Findings

The crux of the study is to validate the data test in a two-way verification model for the aquifer potential map, and it added crucial information for water management by:

1. The new delineated Aquifer Potential map geospatially suggests that FR (- 0.76), ANN-perceptron kappa (0.81), and AHP (0.99) yield a more accurate and unbiased result.
2. Using the National Groundwater Resources Database from the Mineral Resources Department as a secondary dataset suggests pinpoint accuracy of validated datasets.
3. Significant GWZPA findings suggest that 102 points of interest were GPS- and validated by mapping out underlying geological structures and low-to-high water availability at various depth locations. Hence, the purpose of future water security collaboration and public-private partnerships in water and sanitation, as well as aquifer drilling and borewells, is to take proactive measures before disaster strikes.

Conclusions

Thus, with all the acquired points of interest, this prompted further geospatial analysis using Inverse Distance Weighting (IDW) of the 102 points and secondary datasets overlain on the 30m Digital Elevation Model (DEM). This enabled the development of a 2D-3D stratigraphical conceptual model of the study area in ArcScene Pro 3.20. By incorporating all surveyed wells for a more defined visualisation of delineated groundwater and to understand the Management of Recharge and Discharge of the Nadi Basin groundwater reservoir. Hence, for water security and stewardship, this crucial information is intended to assist national policymakers, socialists, economists, and local town planners, as well as water administrators, authorities, and service providers in Fiji.

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Empowering Island Resilience: UAS Mapping, Regulation and Capacity Building Across the Pacific

by Richard Russell | Spatial Intel

Abstract ID: 122

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: UAV

Speaker Bio

Richard Russell is the Business Development Director for Spatial Intel, working across Fiji and the wider Pacific to connect governments and businesses with UAS, advanced mapping and Earth observation products and training. Through partnerships with international companies including -Quantum Systems, Fenix UAS, CHCNAV OroraTech and Picterra, he supports the growth of local capabilities in climate resilience, coastal monitoring, and national mapping programs.

Richard has been supporting Pacific capacity development since 2016 through training, and technology introduction. With an engineering background and field experience across the Asia-Pacific, he seeks to deliver practical, cost-effective, high-quality geospatial solutions tailored to the Pacific.

Abstract

Pacific governments are increasingly adopting modern UAS to support climate resilience, coastal monitoring and national mapping, though many agencies are still building foundational capability. This presentation shares practical lessons from programmes in Fiji, Tuvalu, the Cook Islands and across the region, where teams are developing reliable photogrammetry workflows using the Trinity Pro and its expanding suite of payloads. Spatial Intel is the regional dealer for Quantum-Systems, CHCNAV, OroraTech and Picterra, and works with Fenix UAS as our remote-pilot training and regulatory support partner, assisting with certification pathways, Part 102 exposition development and national regulator engagement.

Advancing Airborne Mapping with the Qube 640: High-Resolution LiDAR for Pacific Environments

by Daniel Worger | Quantum Systems GmbH

Abstract ID: 121

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Mapping

Speaker Bio

Daniel Worger is the Regional Sales Manager for Asia-Pacific at Quantum-Systems, bringing more than a decade of hands-on experience in unmanned systems innovation, integration, and deployment. His career spans aircraft maintenance engineering, rapid prototyping, UAV design, and global business development—giving him a uniquely practical and technical perspective on real-world drone operations.

Since entering the drone sector in 2013, Daniel has worked across OEMs, defence projects, and commercial UAV programmes, helping organisations adopt advanced unmanned capabilities and embed them into everyday operations. His background includes engineering roles building and testing prototype UAVs, leading production teams, and driving market growth for both hardware and geospatial technology companies across Australia, Asia, and North America.

Abstract

The Qube 640 is Quantum-Systems' latest high-resolution LiDAR payload, co-developed with YellowScan to enhance national-scale mapping and Pacific-focused geospatial programmes. With a selectable FOV up to 176°, it enables wide-area and corridor capture of up to 32 km in a single Trinity Pro flight, delivering a 50% productivity boost over the Qube 240. Improved vegetation penetration and clearer canopy-to-ground definition support forestry, coastal monitoring, terrain modelling, and resilience planning. An upgraded IMU minimises edge distortions, while an integrated 8 MP RGB camera enables simultaneous LiDAR and colourized data capture. This session highlights its performance and mapping applications.

Advancing the Moana Data Service: Strengthening Pacific Geospatial Networks Through High-Resolution Land and Marine Mapping

by Christopher Sali | Kahuto Pacific

Abstract ID: 118

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Remote Sensing data and software

Pacific Island states require accurate, interoperable geospatial datasets to support resilient infrastructure development, hazard modelling, and climate-risk planning. The Moana Data Service (MDS) is being developed to address these requirements by establishing a coordinated, high-resolution national geospatial platform tailored to Pacific operational contexts. Since presenting the initial concept at PGRSC 2024, the project has achieved several key technical milestones that advance an integrated land-sea data environment.

A national GNSS ground control survey was completed to provide a consistent geodetic framework for all subsequent acquisitions. High-density airborne LiDAR and multispectral imagery were collected in partnership with Landpro, followed by rigorous classification, DEM/DTM generation, and QA/QC processes to produce authoritative elevation surfaces for hydrological modelling, deformation monitoring, and engineering design. In parallel, Kahuto conducted its first multibeam bathymetry survey and produced a unified topographic-bathymetric dataset, enabling continuous surface modelling for coastal inundation analysis, hazard exposure mapping, and marine spatial planning.

These datasets significantly strengthen national geospatial networks by providing trusted baselines that reduce uncertainty in critical decision-making. Progress to date has been enabled through strategic partnerships with local agencies, private companies, technical providers, and guidance inspired by Land Information New Zealand (LINZ), demonstrating an effective model for sustainable, Pacific-led geospatial infrastructure.

Data Terra's initiatives in the region : from OGS 2022 to the COG-25 project

by Jean Massenet | Data Terra

Abstract ID: 117

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Institutionnal

Data Terra is a French Research Infrastructure dedicated to Earth System and Environment observations.

Inspired by the Oceania Geospatial Symposium (OGS) led in 2022 in Noumea, Data Terra decided to support further initiatives in our region. Therefore, it hired a coordinator dedicated to Oceania, and launched the regional project entitled "Community of Oceania Geospatial 2025" (COG-25) thanks to the support of the French Pacific Fund.

This COG-25 project aims at initiating a long-term dynamic with Pacific Islands in the geospatial field, as it has been presented at the 2024 PGRSC Conference. Now nearing its completion, the time has come to share the actions carried out in recent months with and thanks to the regional community, as well as to clarify the next steps planned, including the holding of OGS 2025 following this 2025 PGRSC Conference.

Monitoring Blue Carbon Ecosystem Using Open-Source GIS & MACBLUE Data

by Shyam Lodhia | GIZ

Abstract ID: 116

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Mapping

Title: Monitoring Blue Carbon Ecosystem Extents Using Open-Source GIS & MACBLUE Data

Theme: Mapping

Presenter: Shyam Lodhia, GIS Officer MACBLUE project, GIZ.

Introduction: The Management and Conservation of Blue Carbon Ecosystems (MACBLUE) project aims to strengthen coastal biodiversity conservation and management through protection and rehabilitation incentives for coastal carbon sinks in Pacific Island countries. It is commissioned by the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) and implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) in close collaboration with regional partners The Pacific Community (SPC) and Pacific Regional Environment Programme (SPREP). The project will utilize innovative remote sensing approaches to map the extent of seagrass and mangrove (SaM) ecosystems in Fiji, Papua New Guinea, the Solomon Islands and Vanuatu. The resulting data will allow inventories of associated natural capital and will support government partners in their efforts to strategically develop and implement conservation, management, and rehabilitation efforts.

Objective: This presentation aims to highlight the capabilities of using the MACBLUE plug-in in QGIS to monitor the extents of seagrass and mangrove ecosystem for the four MACBLUE project countries. This enables the MACBLUE countries to quantify the loss/gain of blue carbon ecosystems for blue carbon reporting and aiding conservation activities.

Method: The MACBLUE plug-in was developed by SPCs earth observation team via the MACBLUE project. The plug-in contains the latest blue carbon ecosystem extent data derived from field data, machine learning and ground verification for the four MACBLUE countries. The MACBLUE plug-in allows QGIS users to analyze and visualize the extents of blue carbon ecosystems without the need for downloading large amounts of earth observation and land cover classification datasets.

Results: The resulting extent maps will allow users to monitor and quantify extent change over time for blue carbon ecosystems for the four MACBLUE countries (VAT, SLB, PNG, FJ) and this change data would enable the respective countries to develop ecosystem management and conservation strategies for the affected areas as well as use the data for

blue carbon reporting. The extent data provided by the MACBLUE plug-in has been verified via ground truthing data and reviews by the respective MACBLUE project countries.

Conclusion: These maps would serve as a robust foundation for the MACBLUE project's mission to assess the ecosystem services provided by these environments, informing policy recommendations for their conservation and restoration.

Keywords: Blue carbon ecosystem, Seagrass Meadows, Mangrove Forest, MACBLUE project, Earth Observation, Qfield, QGIS, Digital Earth Pacific (DEP), Land Cover Mapping, Sentinel-2.

Automated Spatial Workflows for Disaster Response & Risk Management

by Gavin Jeter | Locus

Abstract ID: 115

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Disaster

In the Pacific region and beyond, organisations responding to natural hazards face two major challenges: data overload including sensor networks, imagery, varied formats and time pressure, rapid response required, limited resourcing. This presentation demonstrates how spatial data integration and workflow automation with the FME platform can help meet those challenges. We draw on real-world use-cases from New Zealand and through these examples we highlight the importance of selecting the right data pipeline, designing transformation workflows and operationalising change in your organisations. Attendees will leave with insights on how to structure a spatial-automation journey, ideal for utilities, agencies and remote operations.

Inventory of Common Bamboo in Naitasiri, Fiji

by Wolf Forstreuter | Pacific Wolf Consult

Abstract ID: 114

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Forestry

The Global Green Growth Institute (GGGI) launched the project **“Fiji Bamboo to Adapt and Mitigate Climate Change.”** As part of the project, a pilot inventory was carried out to estimate the availability and characteristics of Bamboo in Fiji’s Naitasiri Province.

The project planning did not recognise the need to fund space-borne image data acquisition or partially outsourced AI-based image analysis. As a workaround, visual interpretation was carried out within the QGIS environment, focusing exclusively on common bamboo.

The common bamboo culms are not straight, they bend outward from the bamboo clump. Another characteristic of *Bambusa vulgaris* is its growth in dense clumps with almost no vegetation between them. The crown area of a common bamboo clump is about twelve times larger than its stocking area. Through the extremely bending culms a unique texture is formed that allows it to be delineated from other vegetation and bamboo species. This is essential but requires: (i) Very high-resolution imagery with sub-metre spatial resolution, free data such as Landsat or Sentinel-2 are not suitable; (ii) Object-based analysis software such as eCognition or AI-based cloud tools or (iii) An experienced team performing visual image interpretation. Fiji’s Forestry Department has experienced interpreters and the bamboo area was mapped within a reasonable time.

To determine stocking, it is necessary to know the number of culms within a clump, as well as the number of clumps per hectare. To get the number of culms per clump, culms are counted within sample plots and the sample figures are then extrapolated to represent the entire clump area.

To use fixed size samples is challenging for bamboo clumps as many culms would cross the sample boundaries. Therefore, a sampling method without a fixed plot size was selected, Prodan’s 6-Tree Sampling. In this method, the team measures the distances from the sample centre to the nearest six culms, along with the diameter of each culm. The distance to the sixth culm is then used to define the sample area, allowing the number of culms to be related to an area.

Even with clear figures describing the relationship between bamboo clump canopy and clump stocking area, the mapped bamboo area cannot simply be divided by the average clump canopy area to estimate stocking as the canopies of different clumps overlap. For each clump, the distances to the three nearest neighbouring clumps were measured to

calculate the average spacing, which was then used to determine the number of clumps per hectare.

Culm diameters were recorded in the six-culm samples, providing systematically distributed diameter data. For each of the four samples within a clump, the culm closest to the sample centre was selected and its length was measured. In addition, the wall thickness was measured using a vernier caliper.

A database has been established, allowing the integration of additional plots when required. The same approach can be applied to common bamboo assessments in other provinces. Mapping can also be continuously updated as new image data become available, with map sheet tiles of Fiji's topographic map serving as sustainable geographical units.

Weaving Wisdom and Innovation: Integrating Traditional Knowledge and Marine Spatial Planning through Te Baiku (Geodatabase platform) for Sustainable Ocean Governance

by Teenari Tekeraoi | Tawake Eriata | Ministry of Fisheries and Ocean Resources | Ministry of Culture and Internal Affairs

Abstract ID: 113

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: GIS software and technics

Kiribati Marine Spatial Planning Coordinating Committee (KMSPCC) - a national committee will present on how GIS is used in implementing national marine spatial planning as well as integrating traditional knowledge (TK) into the Geospatial Platform.

Identifying Forest Invasive Species in Vanuatu Using Machine Learning

by Elenoa Biukoto | Adi Loraini Baleilomaloma | SPC | SPC

Abstract ID: 112

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Forestry

Deforestation in the Pacific is increasingly driven by land clearing and natural disasters such as tropical cyclones. These disturbances have accelerated the spread of invasive species, particularly across exposed and degraded landscapes, where they outcompete native vegetation. One of the most pervasive species, *Cordia Alliodora*, along with other invasive trees, has emerged as a significant environmental stressor across many Pacific Island Countries and Territories (PICTs). Monitoring their spread remains a major challenge due to the scale and rate of invasion.

This study explores the use of Earth observation technologies and machine learning to map and monitor the distribution of invasive tree species across the Pacific. Field data were collected through GPS-based surveys to identify confirmed locations of invasive species, which were then analysed using time-series satellite data in Digital Earth Pacific. Phenological signatures seasonal patterns in vegetation were extracted and used to train models to detect and track invasive species over time.

The results demonstrate promising potential for scalable, region-wide monitoring of invasive flora. These methods provide a valuable foundation for understanding spatial trends in invasion from as early as 2017, supporting more targeted ecosystem management and informing policy responses to land degradation and biodiversity loss in PICTs.

Collaborative mapping to support climate change adaptation for sustainable coral reef management and shoreline defence on Pele Island, Vanuatu

by Gillian Rowan | University of Queensland

Abstract ID: 111

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Mapping

Presenter: Gillian Rowan – The University of Queensland

Theme: Mapping

Abstract:

Vanuatu is highly vulnerable to climate change impacts, particularly severe cyclone impacts, elevated sea temperatures that damage corals and fishing habitats, and sea level rise leading to erosion and shoreline retreat. These impacts are acutely felt on the island of Pele, as illustrated by the continued degradation of the Island's coral reefs and the recent inundation of a cemetery. The Pele Island Environmental Livelihood Solutions Network (PIELSN) was established by members of the Island community to offset these impacts but has thus far been hindered by a lack of local data. This one-year project is a partnership between the PIELSN, the University of Queensland, the University of New South Wales, and Live and Learn Vanuatu. The project aims to collect the data and co-create the knowledge required for the development of locally relevant community management plans, so that Pele communities can adapt to the impacts of climate change through targeted mitigation strategies. To support these efforts, there was a need to create baseline maps of coral reef benthic composition, to facilitate monitoring and targeted restoration, and to integrate coastal LiDAR data with wave and sediment models to predict future climate change induced coastal impacts. Mixed teams of Pele Islanders and Australian researchers conducted snorkel and dive surveys of the coral reefs, deployed wave-measuring sensors, and flew drone-based LiDAR and multispectral surveys. These datasets, in combination with high-resolution (2m) satellite-derived bathymetry (SDB) and imagery, are being analysed using machine learning, artificial intelligence, and numerical modelling to produce detailed coral reef maps (to a depth of approximately 15m), wave models, and coastal risk maps. These data products will also be used to help pilot a sustainable biodiversity financing framework and ocean accounting methodology on Pele Island, in partnership with The Centre for Sustainable development Reform at UNSW. As a project initiated by the Pele community, extensive community consultation and project co-design were prioritised to ensure our methods and deliverables were locally relevant and acceptable, that gender balance and disability equity was achieved, and that culturally appropriate protocols were followed. The methods, data, and code used for this project (which will be made publicly

available) could also be scaled up and applied to other regions in Vanuatu or throughout the Pacific, in areas that are facing similar challenges.

Authors:

Pele community members:

Willie Kenneth – PIENC Chairperson

Salome Kalo – PIENC Secretary

John Alfred – Coordinator

George Kalkaua – Disability representative

Kerry Tamara – Resource Monitor

Chief Maserei – Pele Island Council of Chiefs Chairman

John Ronneth – Nguna Pele Council Area Administrator

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Radar Vegetation Index as an Indicator of Loss and Damage

by Maivunijale Vanualailai Waqa | SPC

Abstract ID: 110

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Mapping

In December 2020, Category 5 Tropical Cyclone Yasa struck Fiji, causing severe impacts across the northern region and devastating key agricultural sectors such as sugarcane and kava. This study examines how satellite observations can be used to assess and quantify cyclone-induced flooding and vegetation damage.

Using both radar (Sentinel-1) and optical (Sentinel-2) satellite data, the analysis focuses on the Radar Vegetation Index (RVI) to detect changes in crop structure and canopy conditions before and after the cyclone. Case studies in Labasa, the main sugarcane belt, and Cakaudrove, where Kava farming dominates, reveal that radar backscatter and vegetation indices can effectively capture flood extent, vegetation stress, and canopy loss associated with extreme weather events.

Also, this study highlights some limitations of radar systems in specifically monitoring small scale farms due to spatial resolutions and overshadowing forests cover posing as a greater challenge in effectively and accurately assessing and visualizing the scale of impacts in small subsistence farms.

However, the findings demonstrate the value of combining radar and optical data for post-disaster assessment, particularly in data-scarce smallholder systems, and highlight the potential of integrating satellite-derived indicators into climate loss and damage assessments across Pacific Island countries.

Assessing unpaved road condition using GIS, Machine Learning, and Satellite Imagery

by Dr Robin Workman | TRL Limited

Abstract ID: 109

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Mapping

Over the past decade, TRL has conducted research into assessing the condition of unpaved roads using satellite imagery, primarily in southern and central Africa. The work has evolved from visual assessments of very high-resolution optical imagery by experienced engineers, to a machine learning-driven algorithm that automates much of the process. Recent research, funded by the European Space Agency and undertaken in Madagascar and Malawi, explored the potential of using lower-resolution satellite imagery to reduce data costs, which are the primary barrier to large-scale implementation.

At the core of the system is the visualisation and analysis of raster satellite imagery within a GIS platform, typically QGIS due to its broad availability. Vector layers are used to delineate road surfaces and generate raster tiles for processing within the machine learning algorithm. To streamline this workflow, a QGIS plug-in '**Earth Observation Pavement Analysis**' was developed. The plug-in automatically identifies tiles along a road centreline and extracts them as individual rasters for direct analysis. Each tile is constrained to the road surface and excludes occlusions such as vegetation, vehicles, or cloud cover through careful data cleaning.

This technology is particularly beneficial in areas where roads are difficult to access and where road authorities face logistical challenges in collecting condition data. Such challenges are common in **Small Island Developing States (SIDS)**, where roads may be distributed across multiple islands, making conventional survey methods costly and inconsistent.

TRL is currently implementing a Road Asset Management System in Vanuatu through the Climate Resilient Transport Project (VC RTP), supported by the World Bank, and will explore the potential application of this satellite-based approach for assessing unpaved road conditions. The satellite imagery itself also has the potential for secondary applications, such as climate vulnerability assessment, drainage evaluation and landslide monitoring. The condition assessment methodology could also be adapted for use with drone imagery, subject to a cost-benefit analysis of data collection and processing requirements.

This ongoing research highlights the growing potential of earth observation and GIS technologies to transform how road networks are monitored and managed in remote and resource-constrained environments, providing opportunities for more efficient and evidence-based infrastructure planning in the Pacific and beyond.

Building a Climate-Informed Road Asset Management System for Vanuatu

by Raviky Talae | Dr. Bhavesh Jain | Vanuatu Climate Resilient Transportation Project / Public Works Department | Transport Research Laboratory (TRL)

Abstract ID: 108

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Mapping

Transport infrastructure across the Pacific Islands is increasingly exposed to climate-induced hazards such as cyclones, coastal inundation, and extreme rainfall, leading to rapid deterioration of road assets and substantial maintenance backlogs. Conventional road asset management approaches in small island developing states (SIDS) are often constrained by fragmented data, limited technical capacity, and the absence of tools that explicitly incorporate climate and disaster risk information into decision-making. This research presents the conceptual framework and early-stage implementation of a **climate-informed Road Asset Management System (RAMS)** developed for Vanuatu under the *Vanuatu Climate Resilient Transport Project (VCRTP)*, supported by the World Bank.

The project addresses a major institutional gap — the absence of a system capable of integrating road asset data with climate and disaster risk information for network-level decision-making. Historically, PWD has relied on the **Road Inventory Management System (RIMS)** and **ProMIS**. While these platforms provide centralized road inventory and project-level management capabilities, they lack the analytical tools necessary for lifecycle planning, prioritization of maintenance, and systematic incorporation of climate risks into investment decisions.

This project proposes a **GIS-driven, multi-criteria asset management framework** that integrates road inventory, condition, traffic, and climate risk data into a unified spatial decision-support environment. A core aspect of the approach is the coupling of traditional asset deterioration and maintenance planning models with **spatial layers representing climate exposure**—such as flood-prone areas, cyclone paths, coastal inundation zones, and slope instability risk—derived from national and regional geospatial datasets. This integration enables the system to identify and prioritize sections of the network that are not only functionally critical but also most vulnerable to climate-related damage.

The methodology combines three key analytical components:

1. **Spatial Risk Overlay Analysis** - integrating remote sensing-based hazard maps and climate model outputs with the national road network to quantify exposure levels for individual road segments;
2. **Condition-Based Deterioration Modelling** - employing performance relationships and historical data to predict asset condition over time under varying climatic

stressors; and

3. **Optimization and Investment Planning** - utilizing a multi-objective optimization framework to balance maintenance needs, risk reduction, and budget constraints, thereby guiding resilient investment strategies.

The implementation leverages **iROADS**, a globally proven and web-based road asset management software, which is used by national and sub-national agencies worldwide. The iROADS framework will be configured to suit the Vanuatu context, integrating spatial, condition, and climate datasets to support investment optimization and resilient maintenance planning. The system's spatial interface will enable visualization of vulnerability hotspots directly on the road assets, while its analytical engine will allow evidence-based prioritization of road maintenance and enhanced resilience planning.

Ultimately, the adoption of **iROADS** under this project will empower Vanuatu to operationalize a modern, climate-resilient, and data-driven road asset management framework — setting a replicable benchmark for other Pacific Island countries facing similar climate and infrastructure challenges.

Development of Decision Ready Tools to Support Coastal and Marine Spatial Planning (I): A Case Study for Funafuti, Tuvalu

by Chan-Su Yang | Sree Juwel Kumar Chowdhury | Dae-Woon Shin | Sea Power Reinforcement and Security Research Department, Korea Institute of Ocean Science & Technology, Busan, Korea | Sea Power Reinforcement and Security Research Department, Korea Institute of Ocean Science & Technology, Busan, Korea | Sea Power Reinforcement and Security Research Department, Korea Institute of Ocean Science & Technology, Busan, Korea

Abstract ID: 107

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Maritime Environment

Alteration of coastal areas significantly impacts coastal communities, and several factors drive these changes. For instance, the coastal regions of Tuvalu, an island nation in the Pacific Ocean, are impacted by frequent tropical cyclones. Therefore, decision-ready tools such as the tools for coastline extraction (algorithm) are essential for Coastal and Marine Spatial Planning (CMSP). This project, entitled 'Development of Decision Ready Tools to Support Coastal and Marine Spatial Planning (I)', aims to develop such tools using multiple satellite data to depict the current circumstances of the coastal regions. Multiple satellite datasets, including Sentinel-2, Landsat-8/9, and WorldView-2 covering Tuvalu, are used to develop methods for coastline extraction, wave feature analysis (wavelength and direction), and land-use mapping. Thus, the changes in the coastline of Tuvalu between 2019 and 2023 are analyzed using Sentinel-2 images. Additionally, the information on the wavelength and wave direction in the vicinity of Tuvalu is also analyzed using Landsat (2014-2023) and Sentinel-2 images (2019-2023), which will be helpful in understanding the driving forces behind coastal changes. Furthermore, pilot testing of the developed methods is currently ongoing in Tonga, through which improvements in the method will be conducted. The outcomes of this project will enhance the understanding of coastal changes and their driving factors, providing valuable insights for the adoption of sustainable management and planning strategies.

APPLICATION OF MULTISENSORY REMOTE SENSING FOR CONTROLLING ILLEGAL, UNREPORTED, AND UNREGULATED (IUU) FISHING ACTIVITIES: PROJECT OVERVIEW

by Chan-Su Yang | Dae-Woon Shin | Sree Juwel Kumar Chowdhury | Sea Power Reinforcement and Security Research Department, Korea Institute of Ocean Science & Technology, Busan, Korea | Sea Power Reinforcement and Security Research Department, Korea Institute of Ocean Science & Technology, Busan, Korea | Sea Power Reinforcement and Security Research Department, Korea Institute of Ocean Science & Technology, Busan, Korea

Abstract ID: 106

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Maritime Environment

The Pacific Island nation has abundant marine resources; however, illegal, unreported, and unregulated (IUU) fishing has caused continuous resource depletion. The project “Application of Multisensory Remote Sensing for Controlling IUU Fishing Activities” has developed techniques that utilize satellite imagery and Automatic Identification System (AIS) data to detect vessels and identify fishing activity. In the case of vessel detection, Sentinel-1 synthetic aperture radar (SAR) imagery is used, where image contrast enhancement, the constant false alarm rate (CFAR) detector, and adaptive thresholding are employed to detect vessels. For optical satellite data, including Sentinel-2 imagery, a deep learning-based detection method is applied. The resulting vessel detections from both sensor types are automatically delivered to end users in standardized formats, including CSV and PNG. Pilot testing of the developed method is currently underway in several Pacific Island countries, including Fiji, Vanuatu, Samoa, Tuvalu, and Tonga. Furthermore, nighttime fishing vessels are detected from Visible Infrared Imaging Radiometer Suite (VIIRS) Day/Night Band (DNB) imagery using an image-processing-based detection approach. The geographic positions of the detected vessels are then stored in a database, enabling the analysis of their spatial distribution and long-term temporal trends. For the Pacific region, vessel activity within the Exclusive Economic Zone (EEZ) from 2017 to 2024 is analyzed, and a vessel density map with associated trend information is generated. Moreover, a machine learning-based approach has been developed to identify fishing activities using vessel speed information derived from AIS and the small vessel tracking system (V-pass) data, and tested in Korean waters. Both AIS and V-Pass information are continuously ingested into a real-time database, enabling the near real-time monitoring and classification of fishing activity. Finally, the outcomes of this project will support the regional operation in identifying and monitoring potential IUU vessels within the EEZs of Pacific Island countries, aiding in the combat of IUU fishing activities.

Assessing Bird Species Richness with LiDAR Derived Forest Community Structural Metrics

by Bradley Eichelberger | Northern Mariana Islands Division of Fish and Wildlife

Abstract ID: 105

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Land Environment

The Commonwealth of the Northern Mariana Islands (CNMI) is an archipelago of 14 islands in the Micronesia region that provide habitat for a number of forest bird species not found anywhere else in the world. The CNMI Division of Fish and Wildlife has a mandate to protect both endangered bird species and prevent further listing of more common species that are found within the archipelago. Land use history has varied both within and across islands with some being heavily modified during pre- and post-World War II occupation. While general habitat preferences for bird assemblages are well known, DFW has been investigating the effect of habitat structure as a means of predicting areas where bird species diversity (richness) may be highest. Vegetation structural metrics were derived from Light Detection and Ranging (LiDAR) points collected from 2019 (OCM Partners 2024) to assess physical vegetation structure within and across vegetation types. Structural metrics were calculated from the point cloud using the lidR package (v.4.1.2) in R and included maximum height, mean height, standard deviation of the point cloud, skewness and kurtosis of the LiDAR point distribution within the pixel (the parameters which define the density of distribution), mean intensity, standard deviation of the intensity, and skewness and kurtosis of the intensity returns. Bird species presence and abundance data were collected through a variety of projects from 2018-2022 (n>200) and generalized linear models were used to analyze the effects of vegetation structure on species richness. Results from this study will be used to assess the habitat suitability of the CNMI's lesser studied and remote northern islands for potential future translocations of species to mitigate against invasive species introductions.

Digital Earth Pacific - regional ocean products and marine habitat maps and monitoring

by Nicholas Metherall | Maivunijale Waqa | Josh Brown | Alex Leith | Elenoa Biukoto | Shyam Lodhia |
SPC | SPC | SPC | Auspatious | SPC | GIZ

Abstract ID: 104

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Maritime Environment

Key words: earth observation, DE Pacific, marine habitats, participatory mapping, peer-reviewed science

Background:

Through scientific literature review, and consultations and co-development with SPC member countries, Digital Earth Pacific (DE Pacific) has developed several products to support PICTs with monitoring their environments. Over the past few years DE Pacific has supported land cover mapping with several SPC member countries across the Pacific. More recently, DE Pacific has focused on several ocean monitoring products:

- Marine habitat mapping (seagrass and others)
- Satellite-Derived Bathymetry
- The Coastline Change Monitoring
- Mangrove mapping
- Intertidal zones

All DE Pacific products are built through scientific peer review. These products are hosted on an open-access, user-oriented platform that emphasizes simplicity, reproducibility, and Pacific sovereignty over data. Users can visualize, analyse, and download layers, making remote sensing practical for policymakers, planners, and communities. By translating pixels into policy-relevant insights, DEP strengthens the science-policy interface and equips Pacific Island countries with the tools they need for proactive, resilient, and inclusive ocean governance.

Presentation aims:

The presentation shares a demonstration of these products and some of the consultative development that went into developing these products with Pacific Island Country and Territories as well as some of the insights from consultations from scientific advisors who led the development of other global models for marine habitats.

These insights are collated and shared with PGRSC audience to learn how to access visualisations and support ocean monitoring.

Methods

1. Needs assessment with Pacific Island Countries and Territories to establish their needs.
2. Scientific literature review and consultation with scientific advisors
3. Participatory mapping and field work with Pacific Island Country and Territory governments and research institutes.
4. Collaborative algorithm development for example (machine learning workflows to classify different marine habitats)
5. Scientific peer review
6. Consultative validation

See figure 1 for more details on the different ocean related products within Digital Earth Pacific.

Trimble GIS Data Collection Technologies & RTX Corrections in the Pacific

by Mary Pasion | ALLTERRA NZ

Abstract ID: 103

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: GIS software and technics

Accurate spatial data collection is critical for effective decision-making across environmental management, infrastructure, and land administration projects. In the Pacific region, many organizations continue to rely on recreational GNSS devices for GIS fieldwork, which often results in positional accuracy limitations when applied to detailed mapping projects.

This presentation will showcase the latest Trimble GIS technologies, with a focus on the Trimble Catalyst DA2 GNSS receiver and its applications in diverse field environments. Through case studies and customer stories, we will demonstrate how Catalyst DA2 has been successfully implemented for eceological fieldwork and surveys, forest mapping, asset management, and other GIS workflows. The session will highlight Trimble RTX correction services available in the Pacific, explaining how these services improve positional accuracy and reliability in areas where traditional correction infrastructure may be limited.

In addition, we will discuss accuracy requirements for different map scales (1:50,000, 1:25,000, 1:10,000, 1:5,000) and outline which GNSS solutions are appropriate for each. By comparing professional solutions such as Catalyst DA2 with recreational-grade GNSS devices, the presentation will provide practical guidance for GIS professionals on choosing the right technology for their data collection needs.

Matching the correct accuracy to the intended map scale is critical, and it's a discussion we often encounter in the field.

As a quick reference:

- 1:50,000 and 1:25,000 scales typically require meter to sub-meter accuracy. This is where handheld mapping-grade GNSS receivers can still be suitable.
- 1:10,000 scale usually requires sub-meter or decimeter accuracy. Recreational GNSS devices often fall short here, as you noted, which can compromise data quality.
- 1:5,000 scale and larger mapping projects generally require decimeter or even centimeter-level accuracy, depending on the end use.

Attendees will leave with a clearer understanding of how scalable GNSS solutions can enhance data quality, support project objectives, and improve confidence in spatial datasets across the Pacific.

AI and multifractal approaches for mapping informal settlement in Oceania

by Mathis Neuhauser | IRD

Abstract ID: 102

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Mapping

by M. Neuhauser*, B. de La Rochebrochard* and M. Despinoy*

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Event: 2025 Pacific Islands GIS & Remote Sensing Conference

Cities in Oceania face a major challenge due to urban growth that is largely unplanned and unregulated by public authorities and is therefore considered informal, a term widely used to describe anything that escapes bureaucratic control and urban planning. It is estimated that 20 to 45 per cent of the urban population lives in these areas, an underestimated rate that could reach 30 to 65 per cent in the foreseeable future. This rapid expansion is currently a challenge for local governments,

Causing various changes in terms of spatial organisation and the lifestyles of their residents, dimensions that are integrated into the challenges of globalisation.

In particular, the Pacific territories are urbanising at an unprecedented rate, especially in Melanesia, which is home to about 90% of the region's total population. The islands are particularly vulnerable due to an increase in the population settled on land whose viable space is increasingly limited by the effects of climate change, such as cyclones, leading to the systematic destruction of habitats and living environments and the reduction of coastlines.

Earth observation data, particularly that obtained from satellites, is a major asset in enabling appropriate spatial and temporal monitoring of urban and peri-urban areas. Cities are complex, organic environments, comprising various sub-spaces and entities that interlock in a heterogeneous manner at different scales. Optical sensors, such as Pléiades, SPOT, Sentinel-2 and Landsat, are commonly used to detect urban forms at local scales (neighbourhoods, buildings) or the analysis of urban areas on a more global scale (city, peri-urban areas).

Two joint projects set up by teams from New Caledonia (New Caledonia University and the french research institute IRD) aim to provide an original approach to monitoring urban dynamics in the Pacific territories (Fidji - Suva, New Caledonia - Noumea and Vanuatu - Port

Vila).

The aim is, on the one hand, to analyse the multi-scale urban properties (multifractal modelling) of Very High Spatial Resolution (VHSR) products in order to better estimate and understand the complex, fragmented and irregular morphology of cities and neighbourhoods, and, on the other hand, to compare these results with those obtained by multi-scale analysis of optical/thermal products with high spatial resolution (Landsat, Sentinel-2, Trishna) in order to highlight the limitations and complementarities of the two types of products in the study of cities. thermal products (Landsat, Sentinel-2, Trishna) in order to highlight the limitations and complementarities of the two types of products in the study of cities. Innovative AI approaches (machine learning and deep learning) will be developed to complement fractal approaches for the automatic categorisation of certain neighbourhoods (formal/informal). An analysis of the temporal dynamics of neighbourhoods will be carried out using a time series of images acquired over several decades.

The initial results of these two approaches (AI and fractals) applied to Noumea will be presented at PGRSC 2025.

Several ranges of scales with distinct fractal properties were identified through textural analysis of satellite images. These results were interpreted by comparison with building contours and were found to correspond to specific elements of urban space acting at precise spatial scales, ranging from the city and its environment (groupings of neighbourhoods) to neighbourhoods (groupings of buildings) and even the smallest urban objects (buildings, roads, etc.). The fractal parameters obtained from Landsat and Sentinel-2 high-resolution products showed the complexity of the urban fabric at the neighbourhood level, a complexity that has been increasing over the last two decades. Similarly, Pléiades products, whose spatial resolution allows for more accurate monitoring at this scale of observation, have highlighted the greater spatial complexity of informal neighbourhoods, reflecting the high unpredictability of these spaces.

To accurately detect buildings, an automatic method for detecting and classifying roofs was developed. The first approach consisted of testing supervised machine learning algorithms (random forest, gradient boosting) on very high spatial resolution Pléiades images (50 cm), enabling an initial level of building extraction. Although these approaches are optimised for discriminating between certain classes (vegetation, bare ground, etc.), they have shown their limitations through confusion between the 'roof' class and other highly reflective artificial elements such as cars or white road markings. To improve detection accuracy, these machine learning results were then used as input data for a segmentation algorithm based on deep learning approaches, capable of learning finer hierarchical representations and offering more accurate and robust building detection, limiting class confusion.

Based on these preliminary results, an automatic method for classifying neighbourhood

types (inner city/suburbs, formal/informal) was tested. This method partitions roof products (generated by the AI algorithm) into windows of uniform size and classifies them according to the morphology of the urban surface (fractal dimension) obtained by applying Fourier-type frequency analysis algorithms (statistical approaches) or box-counting analysis (geometric approaches). Promising results have been obtained in several neighbourhoods of Noumea, making it possible to distinguish between formal and informal neighbourhoods.

Sustainable Drone Regulation for the Pacific Islands

by Andrew Shelly | Fenix UAS Ltd

Abstract ID: 101

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: UAV

Abstract

Drones offer Pacific Island nations cost-effective tools for environmental monitoring, disaster response, and economic development. Yet their potential depends on regulatory sustainability: frameworks that are clear, proportionate, adaptive, and regionally aligned. This paper examines the economic and technical drivers of drone adoption, highlights challenges in pilot training, aerodrome buffer rules, and certification for advanced operations, and contrasts complex global approaches such as SORA with the more practical ICAO model regulations. Through case studies, it argues for pragmatic, harmonised rules that balance safety and innovation, enabling Pacific states to strengthen geospatial networks while ensuring long-term operational resilience.

Bio

Dr Andrew Shelley is Managing Director of Fenix UAS Ltd. In that role he is engaged in providing training to government and private sector drone operators and provides advice to both government and private sector clients. Dr Shelley's PhD considered the regulation of drones and counter-drone systems and specifically included consideration of matters such as aerial trespass and how to effectively control rogue drones.

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Toward a Geospatial network in French Polynesia

by Benoit Stoll | University of French Polynesia

Abstract ID: 100

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Institutionnal

French Polynesia, like many Pacific states, is a multi-island territory covering 4,000 km² spread over an exclusive economic zone of 5 million km². It comprises 118 islands, totaling 4,000 km², divided into five archipelagos. These islands range from the high islands (with and without barrier reefs) of the Marquesas and Society Islands to the atolls of the Tuamotu Islands.

The University of French Polynesia, aware of the challenges of geospatial technologies and their importance for the development and management of multi-island territories, has appointed a project manager who will be responsible for teaching and training in geomatics, and for bringing together and coordinating the geospatial community both within the territory and across the Pacific.

Dr. Benoît Stoll has been a lecturer in remote sensing and geomatics at the UPF for 25 years. He has worked on environmental mapping of vegetation on the high islands and is also in charge of the environmental, historical, and cultural observatory of the Tetiaroa atoll on the geomatics aspect, where he addresses topics as diverse as coastline monitoring, vegetation mapping, place names, archaeological sites, sea turtle nests, etc.

In 2024, the first geospatial event was organized at the University of French Polynesia, in collaboration with Data Terra. The GEOS PF technical and scientific conference brought together the entire geospatial community in the territory: scientists and geomatics specialists from the country, the territory, municipalities, associations, the private sector, etc. With more than 140 participants and two days of presentations, this founding event for the geospatial community was a resounding success.

The author will present his work in remote sensing and geomatics, the GEOS PF event and the mapping of the territory's geospatial community, the major challenges facing geospatial technology in French Polynesia, and the areas of development for this theme at the territorial level and across the Pacific.

The University of French Polynesia recently became a member of PGRSC and wishes to collaborate in the collective effort on geospatial technology across the Pacific by forging links and collaborations and participating in various events and projects organized by the PGRSC community.

Wildfire, Disaster and Climate Monitoring from the world's largest constellation of thermal satellites

by Konstantin Pieper | OroraTech GmbH

Abstract ID: 99

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Disaster

Bio - Konstantin Pieper

Konstantin Pieper serves as Deputy Head of Sales at OroraTech, a Munich-based NewSpace company pioneering satellite-based thermal intelligence for wildfire detection and monitoring. As one of the first full-time employees to join OroraTech shortly after its founding in 2018, Konstantin has been instrumental in scaling the company from a small startup to a global team of over 165 employees. In his current role, he leads the expansion of OroraTech's global commercial operations and customer success initiatives, forging partnerships with emergency services and environmental agencies globally.

Before stepping into his current leadership role, Konstantin was responsible for a broad mix of sales, business development & marketing activities as well as project management. His MSc in Strategic Management focused on the impact of AI on innovation, a perfect fit for OroraTech's mission. This unique foundation allowed him to develop a strategic blend of partnership building and market analysis that connects OroraTech with crucial stakeholders and new opportunities

Abstract:

Climate change is reshaping the Pacific Islands, with hotter and drier conditions increasingly driving wildfire risks in ecosystems that were once considered less fire-prone. This keynote will introduce OroraTech's satellite-based technology and demonstrate how thermal infrared data enables early detection, real-time monitoring, and effective response to these emerging wildfire threats. By leveraging a growing constellation of nanosatellites, OroraTech provides near real-time thermal intelligence that strengthens disaster preparedness and helps safeguard communities and natural resources. The presentation will highlight practical use cases, from early fire detection and hotspot monitoring to supporting disaster response agencies in safeguarding lives and natural resources.

Beyond fire monitoring, OroraTech's data products can also deliver valuable insights into drought resilience through land surface temperature (LST) and water resource monitoring, as well as supporting volcanic hazard management with dedicated eruption datasets. Together, these applications showcase how thermal data and advanced analytics can be integrated into Pacific GIS workflows to address multiple climate-driven challenges and foster long-term resilience.

About OroraTech:

OroraTech GmbH is a global leader in providing innovative SaaS solutions, empowering organizations to tackle wildfires, natural disasters, and climate challenges with confidence. Through cutting-edge satellite technology, advanced analytics, and real-time insights, we help decision-makers protect critical resources, minimize risks, and enhance resilience. From early wildfire detection and predictive fire modeling to post-fire assessments, our solutions provide the intelligence needed to respond swiftly and effectively. Committed to innovation and sustainability, we strive to create a safer, more resilient world for future generations.

- 24 nationalities
- 80+ scientific publications
- over 165 employees across 5 continents
- 27 women in tech & management
- Offices in Germany, the United States, Greece, & Canada

The role of GIS data in contributing to conservation science and impact in Fiji.

by Mrs. Ingrid Qauqau | Wildlife Conservation Society (Fiji Program)

Abstract ID: 98

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Mapping

Geographical Information Systems (GIS) play an important role in advancing and enhancing conservation science and impact through projects and programs implemented by the Wildlife Conservation Society (WCS) in Fiji. Four illustrative examples are presented of how WCS Fiji has integrated spatial data with ecological, cultural, and socio-economic information to identify areas of high environmental vulnerability and priorities for protection and management across Fiji's marine, freshwater, and terrestrial ecosystems. These case studies demonstrate how WCS Fiji has: (1) developed an innovative index to identify critical watersheds for protection and restoration, which was used to inform plans for a national system of forest protection and restoration; (2) prioritized linked catchment-to reef units to protect and restore migratory corridors for diadromous fish species; (3) use outputs from spatial decision-support tools (e.g., MARXAN) to facilitate conversations with landowners of where they establish community locations to establish new community conservation areas; and (4) supported analysis that demonstrated associations between landscape variables and incidence of water-related disease to plan actions with communities and government agencies to reduce disease risk. Active incorporation of spatial data into WCS Fiji conservation work has strengthened collaborative efforts among stakeholders, promoted transparency in conservation actions, and contributed to the long-term sustainability of Fiji's rich biodiversity.

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Collaborative Mapping of Tsunami Evacuation Zones and Routes in the Northern Mariana Islands: The Value of Lidar and Local Knowledge

by Robbie Greene | Pacific Coastal Research and Planning

Abstract ID: 97

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Disaster

The Commonwealth of the Northern Mariana Islands is located in one of the most earthquake-prone areas of the world with over 20 potential tsunami hazard sources. This vulnerable situation is not unique to the Northern Marianas, and is a risk shared throughout the Pacific Islands Region. While the Northern Marianas had pre-existing tsunami hazard models dating back to 2009, residents, visitors, and emergency managers had no official evacuation maps, and therefore were susceptible to ad hoc and potentially chaotic tsunami emergency responses. Tsunami preparedness on the most populated islands of Saipan, Tinian, and Rota in particular hinged on a collaborative mapping effort that balanced scientific data and modeling with local community knowledge and practical considerations.

Pacific Coastal Research and Planning and the Northern Mariana Islands Office of Homeland Security and Emergency Management reviewed tsunami hazard models and maps from 2009 and compared the data with recently released, high-resolution topographic-bathymetric lidar data. Partners were able to identify additional hazard-prone areas, use digital elevation models to revise the tsunami hazard zones for each island, and delineate priority evacuation areas. Lidar was also used to develop basemaps and graphics for a series of 10 participatory mapping workshops, engagement with the public school system, and presentations to the Northern Marianas Legislature to gather stakeholder input.

Guided by high-quality lidar products, local partners then worked with the community to finalize and formally adopt tsunami evacuation maps for the islands. The maps and an associated web map are being used by the Northern Marianas' Office of Homeland Security and Emergency Management in its disaster preparedness and mitigation efforts, and to further its participation in the U.S. National Tsunami Hazard Mitigation Program.

This presentation focuses not only on the mapping and analysis of lidar and tsunami models, but also on the significant value added to the overall evacuation mapping process by incorporating local community input through workshops and participatory mapping exercises. The culmination of the project yielded evacuation zones, routes, and assembly areas that are far more risk-averse than what the initial tsunami hazard models would suggest, and reflect locally nuanced input that could not be captured in more traditional spatial datasets and models.

Mapping, Monitoring, and Prioritizing Large Marine Debris Removals across Micronesia: A Geospatial Tool for the Pacific Islands Region

by Robbie Greene | Pacific Coastal Research and Planning

Abstract ID: 96

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Maritime Environment

The Micronesia Region encompasses over 2.5 million square miles of U.S.-affiliated exclusive economic zones. Hundreds of islands and atolls in this area share a space characterized by a variety of industrial fishing operations and roughly one-third of the world's tropical cyclones. This results in a substantial amount of large marine debris scattered throughout small communities that have little capacity for removal. Efforts to respond to unwieldy debris such as abandoned vessels and derelict fishing gear have been relatively fragmented across the Region, limiting the degree to which resources can be pooled for removals.

In 2023, with the support of the U.S. National Oceanic and Atmospheric Administration, a multi-island collaboration turned to geospatial technology to address this fragmentation. A location-aware field survey and removal prioritization framework was developed and deployed by Mariana Islands-based Pacific Coastal Research and Planning and Palau-based Coral Reef Research Foundation. The survey enables partners to collect standardized information related to vessel and buoy wreckage, the biophysical environment, and hazards posed to human safety. Data are then used to gauge the importance of removal from both an ecosystem and community perspective, and estimate the difficulty of removal. Survey information and field imagery are being synchronized as spatial data services over a shared mapping platform, allowing for the visualization of large marine debris hotspots and priority removal sites. Wreck removal funding sources (e.g. NOAA) now have a living geospatial dataset with which to review and select proposed marine debris mitigation efforts in the Region.

This presentation highlights results of the effort to date, including a brief tour of successful removal sites in the islands of Palau, and offers a glimpse of the tool's expansion to partners in the Federated States of Micronesia, potential adoption in smaller Micronesia communities from Anguar to Ailinglaplap, and perhaps the greater Pacific Islands Region.

Documenting and Sharing Indigenous Geographic Knowledge with a Volunteered Geographic Information System

by Sendo Wang | Associate Professor at the Department of Geography, National Taiwan Normal University, TAIWAN

Abstract ID: 95

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Mapping

There are 16 officially recognized ethnic groups of indigenous people living diversely yet in harmony with the nature in Taiwan for thousands of years. Although each has their own language and culture, they all have inherited and developed geographic knowledge for living sustainably with the nature. However, their traditional ecological knowledge (TEK) is vanishing rapidly due to the loss of their lands and languages.

Thus, a Wikipedia-style collaborative mapping website is proposed in this paper to document, to archive, and to share these TEK. All knowledge articles are contributed by volunteers based on the volunteered geographic information (VGI) concept. The article can be written in the corresponding indigenous language to precisely describe their cultural knowledge. Compare to the Wikipedia, this website is actually a WebGIS. A knowledge article refers to a point, a polyline, or a polygon, which means the knowledge article is georeferenced. The website is composed of open software, such as MySQL, OpenLayers, GeoServer, Drupal and Apache.

We have cooperated with two high schools in the indigenous countries to build up an immersive virtual reality (iVR) using the TEK articles on the proposed website. Students are taught to visit their seniors and to document their TEK, and then upload to the website. Together with photographs and video clips, their TEK is merged into the 3D realistic models of their home tribe. This virtual reality is called virtual tribe. It is an alternative approach for those young students who has moved out their tribe but wish to learn their TEK. For those who are still living in their tribe, we have designed an augmented reality(AR) app so they can learn TEK right in the environment. The feedback from students is positive and encouraging.

QGIS - Spatial without compromise

by Marco Bernasocchi | [OPENGIS.ch](https://opengis.ch)

Abstract ID: 94

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Remote Sensing data and software

Enter description here. In an era where geographic information systems must be open, robust, and globally accessible, QGIS stands out as a paragon of excellence, bridging versatility with uncompromising quality. Leveraging decades of community-driven innovation, this presentation uncovers how QGIS continues to flourish as a Digital Public Good, truly “spatial without compromise.”

Key Highlights:

- **Global & Accessible:** Runs on all major platforms, in 100+ languages, with a steady 4-month release cycle.
- **Recognised Public Good:** Endorsed by the Digital Public Goods Alliance for its openness, inclusivity, and SDG impact.
- **Community-Powered:** Sustained by user groups, volunteers, and donations, ensuring independence and trust.
- **Future-Ready:** Transitioning to Qt6 and preparing QGIS 4.0 for long-term stability and modern performance.
- **Thriving Ecosystem:** A vibrant plugin environment, unified web presence, and ongoing innovation.

Conclusion:

QGIS continues to prove that open-source GIS can be powerful, sustainable, and future-proof.

Truly *spatial without compromise*.

Mapping the World, Empowering People: QField's Vision in Practice

by Marco Bernasocchi | [OPENGIS.ch](https://openGIS.ch)

Abstract ID: 93

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: GIS software and technics

Explore how QField empowers people to map and understand the world—supporting daily tasks, global challenges, and the UN SDGs through open-source, intuitive, and collaborative mobile geospatial tools.

QField helps people map and understand the world—enabling them to solve everyday tasks and tackle global challenges. In this talk, we'll dive into how QField is used in diverse contexts: from conservation and climate action to infrastructure planning and public service delivery.

You'll hear how the app's open-source foundation, intuitive interface, and powerful features are making high-quality field data collection accessible to all. We'll also showcase how QField supports the UN Sustainable Development Goals and fosters a global community of practitioners working for impact. Whether you're new to QField or a long-time contributor, this session will show how the vision of "mapping the world, empowering people" is being realized every day.

Using UAV-RGB Imagery to Assist in Post-Wildfire Damage & Recovery Assessments for Reforestation Sites on Guam

by Jonelle Sayama | Micronesian Area Geospatial Information Center (MAGIC) Lab at the University of Guam

Abstract ID: 92

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: UAV

On Guam, wildland fires are estimated to have burned 23% of total land area between 2015 and 2021 (PICASC, 2023). This poses significant risks for the island's vegetation systems, coastal health, and overall quality of life. Since native plants are inadequately equipped to withstand multiple, frequent burning events, much of Guam's forests are transformed into nonnative grasslands or stripped of vegetation altogether after a wildfire. The emergence of these post-fire badlands leaves the areas susceptible to erosion during heavy rainfall events, which can lead to terrestrial sediment being deposited into coastal areas, ultimately affecting coral reefs and fisheries. Due to the impacts that wildfires pose to the island and its people, it has become increasingly crucial for resource managers to continue implementing innovations that advance existing post-wildfire monitoring and recovery strategies. One key site in Guam that has experienced recurrent wildfires is the *As Gadao* plantation in the southern village of Malesso'. The watershed site, which is part of the Manell-Geus Habitat Focus Area, recently burned on 15 March 2024, and led to the destruction of crucial vegetation and topsoil. In response, remote pilots from the University of Guam partnered with the Guam Department of Agriculture's Forestry and Soil Resources Division to deploy unmanned aerial systems (UAS) and capture high-resolution imagery of the burn site. This poster will illustrate three high-resolution orthomosaics of the *As Gadao* plantation throughout its pre-fire, post-fire, and post-recovery phases. The data will provide insights on total burn area and recovery assessments, specifically in visualizing the fire direction, path of the fire, and potential ignition sites to the Department of Agriculture. This project aims to facilitate discussions regarding collaborative approaches to fire management and how the implementation of UAVs can complement current monitoring efforts to combat the complex issues that arise from wildfire activity on Guam.

Environmental and Management Effects on Guam's Persistent Anthropogenic Wildfires

by Jonelle Sayama | Micronesian Area Geospatial Information Center (MAGIC) Lab at the University of Guam

Abstract ID: 91

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Remote Sensing data and software

For decades, wildfires have regularly occurred across the southern half of Guam, often sparked by residents aiming to improve hunting success by encouraging deer to return to newly regrown areas. These wildfires are typically unsanctioned and uncontrolled, occurring in both remote and semi-populated regions. With over 700 wildfires annually, approximately 4,800 acres of land are burned each year, resulting in significant costs related to emergency response, property damage, and environmental recovery. Despite this impact, the spatial and temporal dynamics of wildfire ignition and spread in southern Guam remain poorly understood. This study uses a multi-model approach to investigate the drivers and consequences of wildfire severity. First, we investigate anthropogenic correlates with wildfire ignition points of the most recent decade to identify geographic traits where wildfires are most likely to be initiated. Second, we incorporate this information into a stochastic model to understand the effects of environmental factors and wildfire response measures on the severity and spread of wildfires. Our models integrate both human and environmental variables to capture the complexity of wildfire behavior in this region. The findings of this project are directly applicable to wildfire management policy in Guam. By identifying high-risk ignition zones and understanding key drivers of fire severity, this research can inform targeted public outreach efforts and enhance response strategies to mitigate wildfire impacts.

Using GIS to Support Ethical Cocoa Supply Chains and EUDR Compliance in the Pacific

by Andrew Blakie | SPS BIOTA. Rautini, GAP

Abstract ID: 90

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Mapping

Grow Asia Pacific (GAP) is a New Zealand-based charitable trust working across the Pacific to promote and support ethical and sustainable farming practices.

Our mission is to improve farmers' livelihoods. To achieve this, we support improvements in yield, quality, and market access, enabling Pacific producers to secure markets and connect with consumers around the world.

With over 35 years of experience in supporting the primary sector, including food production, primary and forestry, GAP collaborates with farmers, governments, exporters, and importers to foster relationships across the value chain.

Partnership & Cocoa Sector Focus

Through the New Zealand Ministry of Foreign Affairs and Trade (MFAT) partnership programme and in collaboration with SPS Biota, GAP has been instrumental in the reestablishment of the Samoan cocoa export industry.

Cocoa is GAP's main area of expertise. We currently run grower and exporter programmes in:

- Samoa
- Fiji
- Vanuatu
- Solomon Islands
- Papua New Guinea
- Philippines

Regionally, we identify opportunities to enhance grower outcomes through higher-yielding varieties, and improved practices in fermentation, drying, and grading. In partnership with **Rautini** (a premium cocoa bean buyer and promoter) we work directly with farmers and primary producers to bring high-quality cocoa to premium markets in New Zealand, Australia, the United Kingdom, and the EU.

EUDR Compliance & Traceability

Market access for cocoa products into Europe is increasingly influenced by the EU

Deforestation Regulation (EUDR), which seeks to ensure that imported products are not associated with deforestation. To comply, growers and supply chain operators must be able to demonstrate exactly where their crops are grown and maintain traceability from origin to importer.

GAP has identified a clear opportunity to use GIS to support this process. With support from **Eagle Technology** (New Zealand's Esri agent), we have access to a suite of Esri GIS tools and discounted licences. This enables GAP and our network of growers, producers, and exporters—to collect, manage, and share the data required for EUDR due diligence and compliance.

We also plan to provide **in-field GIS training** for stakeholders, empowering them to adopt and adapt Esri tools for their own operations.

Presentation Overview

This presentation will outline how GIS enables traceability and EUDR compliance through:

- **Farm identification**
- **Chain of custody tracking**
- **Data collection and sharing between stakeholders**

Using tools such as **Field Maps**, **Survey123**, and **Dashboards**, we facilitate data capture and communication among growers, exporters, and regulators. These tools not only apply to cocoa but are also relevant for other commodities regulated under the EUDR, such as:

- Cattle
- Coffee
- Oil palm
- Rubber
- Soya
- Wood

From Registry to Map: Geospatial Visualization of Cancer in Micronesia

by Christine Chaplin | Stantec GS, Honolulu, Hawaii USA

Abstract ID: 89

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Mapping

Cancer is now the second leading cause of death in nearly all U.S.-Affiliated Pacific Islands (USAPI), driven by rapid westernization and rising non-communicable diseases. To visualize and better understand the spatial distribution of cancer cases across the Marianas, we used Esri's ArcGIS Dashboards to display cancer types at multiple geographic levels. This presentation will cover the motivation for the project, the workflow used to assign locations to cancer registry data, and symbology techniques used to support clear, interactive mapping across jurisdictions. We will also demonstrate how the resulting dashboard provides a lightweight, accessible tool for exploring cancer trends in a geographically complex region.

A Brief History of Digital Earth

by Alex Leith | Digital Earth Pacific

Abstract ID: 88

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Remote Sensing data and software

Twenty five years ago, Al Gore spoke about his vision for a Digital Earth, where the full range of data about our planet and our history would be at our fingertips. In those intervening years, we have made progress, and while we still have more to do to achieve his vision, the cloud native geospatial paradigm is a fundamental step towards its realisation.

In this presentation, Alex Leith will give an overview of three Digital Earth Platforms, and how they demonstrate the evolution of Earth observation data accessibility and availability and suggests that we are entering a new era of interoperability, where data is at our fingertips, and the future is here, albeit unevenly distributed. Let's work together to help broaden the adoption of cloud native geospatial, from both data custodians to data consumers, and together, we can help realise the vision for a Digital Earth.

The Pathway to Geospatial Excellence

by Sarah Pitcher-Campbell | N/A

Abstract ID: 87

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: GIS software and technics

“The Pathway to Geospatial Excellence” outlines a strategic framework for organisations to fully leverage GIS technology and achieve impactful, sustainable outcomes. It emphasizes aligning GIS with business goals, fostering governance, and building a culture of continuous improvement.

What Is Geospatial Excellence?

Geospatial excellence is the consistent, strategic use of GIS to solve problems, drive innovation, and deliver measurable value. It’s not just about technology—it’s about integrating GIS into the fabric of an organization’s operations, decision-making, and culture.

The Path to Geospatial Excellence outlines a strategic framework built on five core components that empower organizations to transform GIS from a technology tool into a powerful enterprise capability:

1. Business

- A business-oriented strategy that defines how GIS supports organizational goals.
- Aligns people, processes, and technology to address real-world challenges.
- Encourages a vision-driven, outcome-focused approach.

2. Governance

- Establishes policies, roles, and accountability for GIS use.
- Promotes leadership engagement and structured decision-making.
- Ensures GIS investments are aligned with enterprise priorities.

3. Systems

- Focuses on building a robust, scalable GIS platform.
- Encourages flexible implementation patterns tailored to organizational needs.
- Supports discoverability, usability, and sharing of geospatial content.

4. Engagement

- Drives adoption of GIS through communication, engagement, and support.
- Highlights GIS benefits to stakeholders.
- Reinforces a culture of geographic thinking and continuous improvement.

5. Capacity

- Builds GIS proficiency across all levels of the organization.
- Identifies skill gaps and provides targeted training.
- Empowers teams to innovate and contribute meaningfully.

Why it matters

By integrating all five pillars—Business, Governance, Systems, Engagement, and Capacity—organizations elevate GIS from a point solution to a strategic enterprise asset. This holistic approach fosters sustainable, resilient geospatial programs with measurable outcomes

Implementation Approach

- **Assess:** Understand current GIS maturity, capabilities, and alignment with business needs. Where does your organization stand across the five components?
- **Plan:** Define a roadmap with clear objectives, milestones, and success metrics. Set short- and long-term objectives for each pillar.
- **Act:** Deploy strategies, governance frameworks, technologies, outreach, and training.
- **Measure & adjust:** Track metrics, share success stories, fine-tune continuously.

Key Takeaways

- GIS should be treated as a core business capability, not just a technical tool.
- Success depends on leadership support, strategic alignment, and organizational buy-in.
- Continuous learning, innovation, and adaptation are essential to long-term excellence.

Proposal Title: GIS-Driven Biosecurity Surveillance in New Zealand's Forests: A Case Study from SPS Biota

by ANDREW BLAKIE | SPS Biota

Abstract ID: 86

Event: 2025 Pacific Island GIS & Remote Sensing Conference

Topic: Mapping

SPS Biota undertakes biosecurity surveillance for New Zealand's forest industry and the Ministry for Primary Industries (MPI). With over 20 years of experience, SPS Biota has transitioned from paper-based data collection to a fully integrated digital platform for inspection, sample submission, and reporting—built using Esri GIS products.

Using tools such as Field Maps, Survey123, QuickCapture, and Dashboards, SPS Biota has developed a comprehensive suite of applications that enable field staff to efficiently carry out inspections and submit samples for laboratory analysis.

Forest Biosecurity Programmes

SPS Biota supports three key forest biosecurity surveillance programmes:

1. **Forest Health** - Exotic rural forests: approximately 3,200 inspections annually across the New Zealand exotic forest estate.
2. **Forest Biosecurity Surveillance** - Urban "forest trees": approximately 4,500 inspections annually.
3. **High Risk Site Surveillance (HRSS)** - Urban trees: approximately 7,000 inspections annually.

Presentation Overview

The presentation will demonstrate how SPS Biota uses GIS tools to support the inspection, sampling and reporting workflow:

1. **Planning inspections** - Using ArcGIS Online (AGOL), Dashboards, and ArcGIS Pro.
2. **Navigating to inspection points** - With Field Maps.

3. **Recording inspection details** - Using Field Maps and Survey123.
 4. **Submitting samples for analysis** - Via Survey123.
 5. **Reviewing and sharing results** - Through AGOL Dashboards.
-

Planning

A web-based experience is used to allow staff to edit and select transects or areas requiring inspection. This streamlined two-click process updates the inspection parameters instantly, and changes are reflected live in Field Maps.

Inspections

Field staff can update inspection attributes such as the date, surveyor name, and host species. These updates are automatically reflected in the symbology of transects, indicating inspection status. The data is concurrently updated on management dashboards, enabling real-time oversight.

Submissions

Samples requiring identification are submitted using Survey123. Host details, collection information (including geolocation), and other metadata are updated live on Laboratory Dashboards, enabling efficient sample tracking and results entry.

Review

Interested parties can access inspection data via interactive dashboards. These dashboards allow for:

- Data filtering,
- CSV export of inspection records,
- Viewing of submitted images and records.

HRSS Programme and Biosecurity Assurance

Under the HRSS programme, SPS Biota targets high-risk host plant species as specified by MPI, to meet quarantine and biosecurity requirements. This includes surveillance for pests and pathogens such as *Xylella fastidiosa*. The data collected supports MPI in verifying and declaring New Zealand's pest-free status. HRSS inspections also allow for earlier detection of potentially harmful pests and diseases before the pest or disease becomes too difficult to eradicate if MPI chooses to try for eradication.

Future Developments

SPS Biota is currently integrating remote sensing systems to identify areas of potential forest health decline. These areas can then be prioritised for in-field inspections to validate the remote observations.

Additional Surveillance Work

SPS Biota also undertakes targeted surveillance for other high-risk pests, including:

- **Spongy Moth,**
- **Brown Marmorated Stink Bug,** and
- **Arbovirus.**

These survey programmes utilise similar Esri-based GIS mapping and sampling methodologies.

Visual Examples

The attached maps and dashboard provide examples of how spatial tools are applied:

- **Map 1: Forest Health (FH)** - Displays plot locations and drive lines. Users can filter

by forest location and print tailored maps for use in the field.

- **Map 2: HRSS** - Shows polygons indicating areas of work. Polygon colour (symbology) reflects status—**green** indicates completion. Transect lines also change colour based on inspection status.
- **Dashboard** - Visualises HRSS progress by region. It includes external links to Excel sheets that detail outstanding work per region.