Potential Impact on the Tentative Cultural & Natural Heritage Sites in Papua New Guinea, after M7.5 (17.44 UTC) Earthquake
UNITAR – UNOSAT, following the request of Papua New Guinea Conservation and Environment Protection Authority & The National Museum and Art Gallery, has performed a satellite based analysis of the tentative cultural and natural heritages sites of:

The Kikori River Basin / Great Papuan Plateau
- Kikori River Karst
- Mount Bosavi
- Lebanon Wildlife Management Area
- Sulamesi Wildlife Management Area
- Kutubu Area

The Sublime Karsts of Papua New Guinea
- Muller Plateau
- Hindenburg Wall

The aim is to search for potential impact caused after the M7.5 earthquake that struck Papua New Guinea on the 25th February 2018 (17.44 UTC).

For this analysis UNOSAT has used post-event cloud free images of the area, collected on 1, 2, 3, 7 and 11 March 2018, and the most recent pre-event satellite image before the earthquake occurred.

Comparison between these images allows to identify and detect changes that happened in this period of time and they can be related to the impact caused by the earthquake in Papua New Guinea.

The findings are illustrated in the following pages. This is a preliminary analysis and has not yet been validated in the field. Please send ground feedback to UNITAR – UNOSAT.
Kikori River Karst – (Kikori River Basin & Great Papuan Plateau) – Southern Highlands Province
Shake Intensity Zone V (124 km south east of the epicentre)
Image collected on 2 March 2018 shows the presence of areas where vegetation losses are observed. Inset 2 refers to new visible landslide, while Inset 1 and 3 show the presence of potential landslides. In the case of Inset 1, the shape of the landslide is anomalous, while for Inset 3 the area was in the shade in the pre-image. Kikori River Karst, does not seem affected, as no visible changes were observed over the specific location submitted, however this might be underestimated due to the characteristics (resolution, angle, cloud cover percentage…) of the satellite image and the nature of the cultural site. Vegetation losses and the appearance of new landslides in the surrounding areas are an indirect indicator of potential impact on this site. Field assessments are necessary to validate this analysis and determine whether affected areas not detected by satellites are present.
Mount Bosavi – (Kikori River Basin & Great Papuan Plateau) - Southern Highlands Province
Shake Intensity Zone V (60km south of the epicentre)
Image collected on 1 March 2018 shows areas subject to new landslides, triggered especially on the northern part of Mount Bosavi crater (extinct volcano), as a secondary effect of the earthquake that struck Papua New Guinea on the 25th February 2018.

Inset 1 and Inset 2 refer to new visible landslides, while Inset 3 shows new landslides and reactivated or enlarged ones as of 1 March 2018.

In the analysis are indicated also pre-existing landslides, stable and unchanged before and after the earthquake, and potential landslides, which were partially obscured by the clouds in the pre-image. The appearance of new landslides and the reactivated ones in the northern part of the crater are clear indicators of the impact on this site.

Field assessments are recommended to validate this analysis and determine whether affected areas not detected by satellites are present.
Lebanon Wildlife Management Area – (Kikori River Basin & Great Papuan Plateau) - Southern Highlands Province
Shake Intensity Zone VII & VIII (30km south east of the epicentre)
Image collected on 7 March 2018 shows areas subject to new landslides, triggered along both banks of Tagari River as a secondary effect of the earthquake that struck Papua New Guinea on the 25th February 2018.

Inset 1 and Inset 3 refer to new visible landslides. In the case of Inset 1 the landslides are inside of Lebanon WMA while for Inset 3 they are outside the site. Inset 2 shows an increase of the Tagari River bed along both banks, resulting in some inundated areas.

Even if the coverage between pre and post satellite images differs, the post image covers around 93% of the area.

No further visible changes or additional impacts were visible in other parts of Lebanon Wildlife Management Area as of 7 March 2018.

The appearance of new landslides on the eastern part of Lebanon WMA along the banks of Tagari River are clear indicators of the impact on this site.

Field assessments are recommended to validate this analysis and determine whether affected areas not detected by satellites are present.
Comparison analysis between pre-earthquake satellite imagery collected on the 22 February 2018 and post-earthquake satellite imagery collected on the 2 March 2018 does not show visible changes. The area reviewed covers the south eastern part of Sulamesi Wildlife Management Area, located more than 70 km south east of the epicenter of the earthquake. The rest of the Sulamesi WMA was not analyzed in this report due to significant cloud cover or unavailability of satellite images. Insets 1, 2 & 3 show examples of no visible changes or impacts during this period. Field assessments are recommended to validate this analysis and determine whether affected areas not detected by satellites are present.
Kutubu Lake and Surrounding Area – (Kikori River Basin & Great Papuan Plateau) - Southern Highlands Province
Shake Intensity Zone VII (55km south east of the epicentre)
Image collected on 11 March 2018 shows areas subject to new landslides, river diversion, overflowing areas and vegetation losses as secondary effects of the earthquake that struck Papua New Guinea on the 25th February 2018. Inset 1 and Inset 2 refer to new visible landslides. In the case of Inset 1 the landslides also caused river diversion in the upper stream area, located north of Kutubu Lake. Inset 3 shows an expansion of the north eastern part of Kutubu Lake causing inundations in the margins.

All these different secondary effects that affect Kutubu Lake and the surrounding area are clear indicators of the impact on this site. Field assessments are recommended to validate this analysis and determine whether affected areas not detected by satellites are present.

**Inset 1** – New landslides & river diversion

**Inset 2** – New landslide

**Inset 3** – Overflown Lake

**Inset 3** – Overflown Lake

**Inset 1** – New landslides & river diversion

**Inset 2** – New landslide

**Inset 3** – Overflown Lake
Mamo Plateau - (The Sublime Karsts of Papua New Guinea - Muller Plateau) – Hela Province
Shake Intensity Zone VI & VII (70km north west of the epicentre)

14 February 2018

2 March 2018

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Image collected on 2 March 2018 shows areas subject to new landslides, triggered ~7 kilometers south east of Mamo Plateau site, as a secondary effect of the earthquake that struck Papua New Guinea on the 25th February 2018.

Inset 1 refers to reactivated or enlarged landslides, while Inset 2 and Inset 3 refer to new ones as of 2 March 2018.

No visible changes have been detected around Mamo Plateau, but part of the site might be obscured by cloud cover.

Multiple new landslides, mainly mudflows, and reactivated ones are visible along both banks of the rivers, considered as clear indicators of impact on Muller Plateau, but not on Mamo Plateau.

Field assessments are recommended to validate this analysis and determine whether affected areas not detected by satellites are present.
Large Treeless Basin & River Cave Outlet - (The Sublime Karsts of Papua New Guinea) – Hela Province
Shake Intensity Zone VI (44 km north west of the epicentre)

14 February 2018

Mueller Plateau
(North eastern part)

River Cave Outlet
(Large Treeless Basin)

2 & 11 March 2018

Mueller Plateau
(North eastern part)

River Cave Outlet
(Large Treeless Basin)
Imagery collected on 2 & 11 March 2018 shows areas subject to new landslides, triggered in the surrounding areas of River Cave Outlet site, as a secondary effect of the earthquake that struck Papua New Guinea on the 25th February 2018.

Inset 1 & Inset 2 refer both to new visible landslides. While in Inset 1 the new landslides are located 1.2 kilometers north west of River Cave Outlet, in Inset 2 new landslides are located 1.8 kilometres south west of the site.

Not visible changes have been detected in the specific location of River Cave Outlet, but part of the site might be obscured by cloud cover.

Comparison analysis between pre and post earthquake satellite image shows a decrease of the size of the lake located 500 m south west of the site.

Appearance of new landslides in the surrounding areas are an indirect indicator of the potential impact on this site. Field assessments are recommended to validate this analysis and determine whether affected areas not detected by satellites are present.
Hindenburg Wall – (The Sublime Karsts of Papua New Guinea) - Western Province
Shake Intensity Zone IV (175km north west of the epicentre)
Image collected on 3 March 2018 shows areas subject to new landslides, and road obstruction as secondary effects of the earthquake that struck Papua New Guinea on the 25th February 2018.

Inset 1 refers to a reactivated landslide inside Hindenberg Wall site while Inset 2 refers to a new landslide that affected the road leading to Tabubil City from the north.

Due to high percentage of cloud cover over the pre and post satellite imagery, the analysis only considered the northwestern part of Hindenburg Wall.

The presence of landslides inside Hindenberg Wall and in the surrounding areas are clear indicators of the impact on this site.

Field assessments are recommended to validate this analysis and determine whether affected areas not detected by satellites are present.