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**LA PRATIQUE DE L'ESPACE
EN OCÉANIE
DÉCOUVERTE, APPROPRIATION
ET ÉMERGENCE
DES SYSTÈMES SOCIAUX TRADITIONNELS**

***SPATIAL DYNAMICS IN OCEANIA
DISCOVERY, APPROPRIATION
AND THE EMERGENCE
OF TRADITIONAL SOCIETIES***

ACTES DE LA SÉANCE
DE LA SOCIÉTÉ PRÉHISTORIQUE FRANÇAISE
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Frédérique VALENTIN et Guillaume MOLLE

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7

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Siège social : 22, rue Saint-Ambroise, 75011 Paris
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Tél. : 01 46 69 24 44
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*La pratique de l'espace en Océanie :
découverte, appropriation et émergence des systèmes sociaux traditionnels
Spatial dynamics in Oceania: Discovery,
Appropriation and the Emergence of Traditional Societies*

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‘Controlling the Elements’

Anthropogenic Landscape Transformation at Ava Ranga Uka A Toroke Hau, Rapa Nui (Easter Island)

Annette KÜHLEM

Abstract: The site of Ava Ranga Uka A Toroke Hau is located in the very center of Rapa Nui (Easter Island) on the eastern slope of the Terevaka volcano. Its location within the small valley of the Quebrada Vaipú (Vaipú Creek) as well as the presence of two massive gravity walls and an elaborately built water basin with petroglyphs initially motivated an archaeological investigation, which eventually provided unexpected new results. Indeed, excavations in the center of the site have shed further light on the dimension of anthropogenic landscape transformation in pre-contact times. It turned out that cultural deposits of more than 6 m form an artificial plateau in the original creek bed. Anthropogenic use surfaces were created by transporting some sediment from different sources including alluvial sediment and boulders washed down the river during catastrophic rain events. These were moved and spread out to form an even surface. The sediment was highly compacted over large areas. Elaborately laid pavements also spanned great parts of the small valley. Some outstanding features were discovered in these layers: parallel canals for channeling the water flow, circular planting pits for palm trees, hearths for the production of red pigment etc. These demonstrate the hitherto unknown dimension of ‘domestication’ of the natural elements on Rapa Nui.

Keywords: Easter Island, Rapa Nui, archaeology, landscape transformation, earthworks, pavements, planting pits, palm trees, water, fertility cult.

« Contrôler les éléments » : transformations anthropiques du paysage à Ava Ranga Uka A Toroke Hau, Rapa Nui (île de Pâques)

Résumé : Le site Ava Ranga Uka A Toroke Hau est localisé au centre de l'île de Rapa Nui, sur la pente orientale du volcan Terevaka. Sa position dans le petit vallon Quebrada Vaipú, ainsi que la présence de deux murs de soutènement et d'un bassin artificiel portant des pétroglyphes constituaient les raisons premières motivant un projet de fouilles archéologiques, qui a finalement produit des résultats inattendus. Ces fouilles conduites au centre du site ont révélé l'importance de la transformation anthropique du paysage durant l'époque pré-européenne. On observe notamment que des dépôts non naturels de plus de six mètres d'épaisseur ont formé un plateau artificiel au-dessus du lit de la Quebrada Vaipú. Ces dépôts, d'origine anthropique, sont constitués de différents types de sédiments : alluvions et roches transportées en aval lors de pluies catastrophiques furent déplacées et épanchées dans le but de créer une surface plane. De plus, des sédiments furent compactés dans certains endroits et des pavages bien élaborés ont couvert d'importants secteurs du petit vallon. Parmi ces couches d'origine anthropique, plusieurs particularités furent mises en évidence : des canaux parallèles pour diriger le flux de l'eau, des fosses circulaires destinées à la plantation de palmiers, des foyers pour la production de pigments rouges etc., démontrant clairement une « domestication » des éléments naturels à Rapa Nui, phénomène jusqu'alors mal connu.

Mots-clés : île de Pâques, Rapa Nui, archéologie, transformation du paysage, pavages, fosses de plantation, palmiers, eau, culte de la fertilité.

EASTER ISLAND, or Rapa Nui, is the most isolated island in the world. It politically belongs to Chile although it lies over 3,000 km from the coast of South America and 1,800 km from Tahiti. Despite its

remoteness, the island is famous worldwide, mainly for the prominent stone statues, the *moai*, often displayed on ceremonial platforms called *ahu*. The great majority of the *ahu* are found along the shoreline with the erected

moai looking inland. Apart from these so-called image *ahu*, there are many platforms without statues of various types and sizes (see Martinsson-Wallin, 1994). For decades, archaeological research on the island focused on these stone giants and their platforms and only in recent years have other aspects of pre-contact life on Rapa Nui been investigated.

The German Archaeological Institute in cooperation with the Museo Antropológico Padre Sebastian Englert has been conducting excavations in the center of the island since 2007 (Vogt, 2009 and 2013; Vogt and Moser, 2010a and 2010b; Kersten et al., 2009; Fassbinder et al., 2009; Vogt and Kühlem, in press; Kühlem et al., 2015). The site is called Ava Ranga Uka A Toroke Hau and lies in a small widening of the Vaipú creek running from the crater lake (Rano Aroi) of the Terevaka volcano to the sea shore on the south coast of the island (fig. 1). The location of the site is of particular importance because of two reasons. First, its position almost exactly in the center of the roughly triangular island, which makes the

associated Ahu Hanua Nua Mea (Rainbow Ahu) the most inland ceremonial platform on Rapa Nui. Second, the fact that it lies partly within, partly on the sides of one of the very few seasonal streams on the island. Even though a few ravines carry water to the shore in the event of heavy rains, the Vaipú creek is the only significant source of surface fresh water aside the three crater lakes of the volcanos Rano Aroi, Rano Raraku and Rano Kau.

THE PROBLEM OF FRESH WATER ON RAPA NUI

Fresh water has always been and still is a scarce resource on Rapa Nui. While rivers are usually frequent on most Polynesian high islands, they are here missing. The crater lakes are difficult to access and the sources of subterranean water in many caves were surely not known to everybody and in many cases involved exertive climbing.

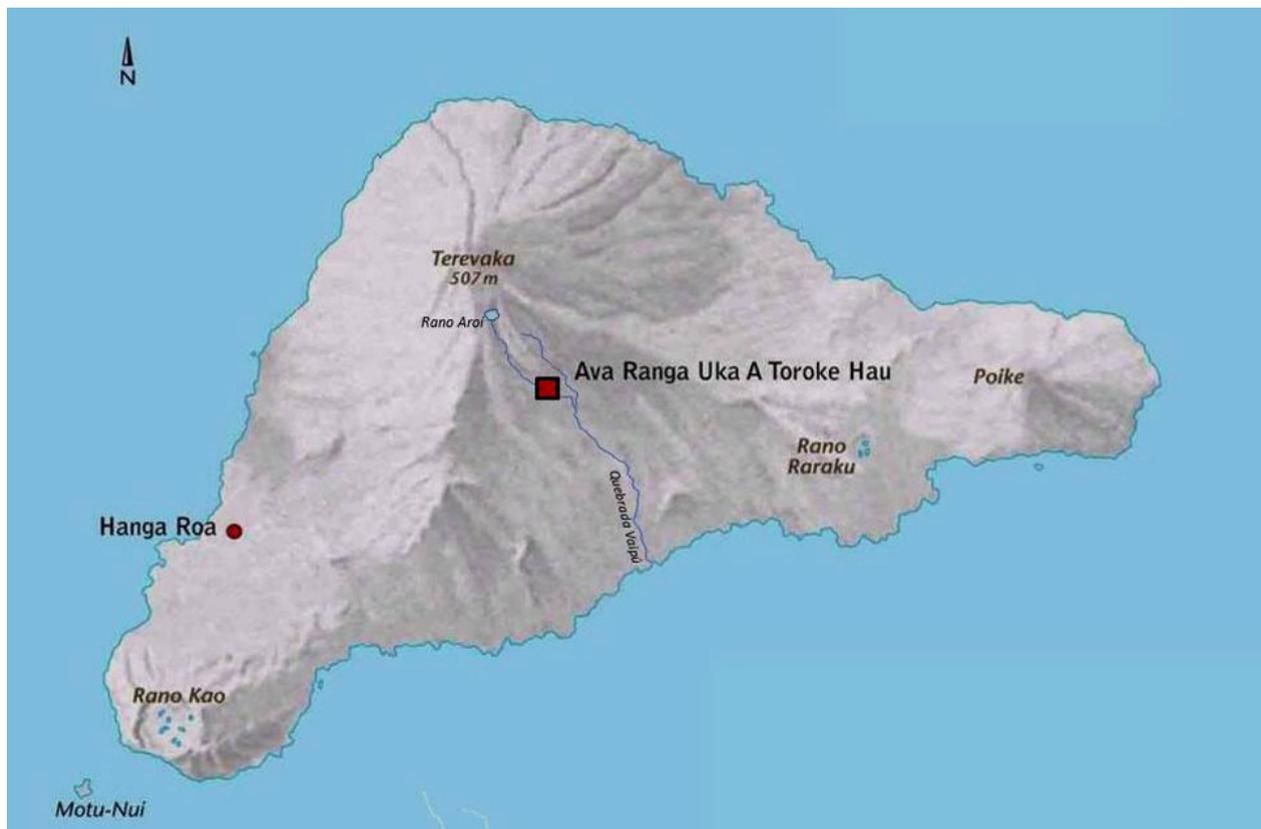


Fig. 1 – The location of the site in the center of the island (map DAI).

Fig. 1 – La localisation du site au centre de l'île (carte DAI).

In pre-contact times, the only containers for transporting the water were small gourds, as pottery for larger vessels was unknown. Early European explorers such as Cook and La Perouse already mentioned that the water from the wells in the coastal areas was brackish and of poor quality. Water management thus must have always played an important role for the Rapanui people.

THE VAIPÚ CREEK

At Ava Ranga Uka A Toroke Hau (from here designated as ARUTH), archaeological investigation seem to indicate that water management may have been part of a larger fertility cult. This manifested itself in

the intensive transformation of the local environment along the Vaipú creek. The importance of this life vein becomes clearer once realizing that the entire course of the creek has been anthropogenically altered: dam structures, embankment enforcements, pavements, etc., line the creek bed. These features demonstrate the intensity of ‘landscape domestication’ on Rapa Nui that eventually affected all natural elements on the island.

While hydraulically active structures along the Vaipú creek are numerous, settlement structures are not. All forms of house architecture documented on Rapa Nui display stone foundations that were mapped as part of a survey and mapping project in the 1970s (see Cristino et al., 1981). The scarcity of settlement sites in this area is surprising bearing in mind that fresh water was a limited resource. One would expect a significantly higher settlement density in the vicinity of the very few accessible sources of surface water. The lack of archaeological evidence for dwelling areas indicates that water in the Vaipú creek probably did not serve profane purposes and was not accessible by everybody. Another indicator of this is the existence of the most inland Ahu Hanua Nua Mea located on the side of the creek, meaning that the area was under the control of Rapanui elites.

THE EXCAVATIONS AT AVA RANGA UKA A TOROKE HAU

As mentioned above, the site of Ava Ranga Uka A Toroke Hau (ARUTH) lies directly in and along the course of the Vaipú creek. As it is a seasonal river, there is no or very little water coming down the creek during most part of the year. However, during and after heavy rainfall, the small creek can instantly transform into a torrential stream. As the entire palm tree vegetation of Easter Island was cut down in pre-contact times, the surface was left with no means to hold back water. It runs unhindered from the sides of the creek into the ravines, sometimes with destructive force.

The toponym of the site stands in direct relation to such heavy flood events. Ava Ranga Uka A Toroke Hau means “creek in which the body of Uka, daughter of Toroke Hau, floated in the water” (Englert, 1948, p. 283). This name is connected to an undated oral tradition that relates how the hut of Uka was washed away from the side of the creek during heavy rains and how she drowned in the water.

One or more such flood events were also responsible for the destruction of a part of the installations at ARUTH, cutting through a thick succession of cultural layers and through two massive walls that initially spanned the creek bed.

These massive walls were among the visible surface structures at the beginning of the excavations (fig. 2). Others were the Ahu Hanua Nua Mea mentioned above with a fallen *moai* on the northeastern embankment and the uppermost slabs of a stone basin in the creek bed (fig. 3). The presence of an *ahu* at the site indicates the

frequentation by elites and the strong religious component of the installation.

Initially the two massive walls were interpreted as dam structure and the widening of the creek above them as reservoirs to hold back and store fresh water. This interpretation had to be revised as excavations were conducted in the area. It appeared that the entire part above the walls consists of a series of three pavements and anthropic layers including only minor stratigraphic units of natural deposits in between (fig. 4). The stratigraphy is over six meters thick, making it quite unique on Rapa Nui. The red arrows on figure 5 show where an entire sediment island was anthropogenically formed.

Anthropogenic layers

Not only the thickness of the anthropogenic layers is exceptional for Easter Island. In fact the sediment island mentioned above is an undocumented kind of earthwork involving a great amount of human labor. Sediment was transported to the site from different locations and there spread out over large areas (fig. 6). These almost perfectly horizontal use-surfaces were compacted to different degrees. In the upper layers, the soil is less compacted and the layers seem to have had a primarily agricultural purpose: planting pits filled with garden soil were evenly spaced and interspersed with numerous fire pits. Some of these yielded a very fine powdery red substance interpreted as pigment, possibly for body (and/or image?) painting. Such pits for the production of pigment have been found in great numbers in the area around ARUTH (pers. comm. Hans-Rudolf Bork and Andreas Mieth).

A thick layer of rubble seems to mark a change of use of the central part of the site. It is clearly related to an extreme flood event that occurred in ARUTH. The material was carried down the stream bed by gushing waters and was then again spread out by people to form an almost horizontal surface.

Underneath this layer of rubble, the anthropogenic use-surfaces are noticeably different: the soil is so densely compacted that the surface is very hard and still shows imprints of pavement slabs that had been removed secondarily. This layer practically seals off the underlying pavement, which is the uppermost of three that could be documented in the embankment profile (see fig. 4).

This succession of anthropic surfaces is a phenomenon that was so far unknown on Rapa Nui. In the upper layers, this can be explained as bringing in favorable sediments for the cultivation of plants. Many evenly spaced planting pits have been found in those layers. They yielded numerous obsidian tools, namely *mata’u* (tanged pieces). Recent phytolite analysis of those tools has shown that they were largely used for cutting plant material, thus seem to have been used mainly for agricultural purposes (Atam, 2010). The many finds are hence a further indicator that agricultural activities took place in the upper layers at ARUTH.

The function of the lower densely compacted layers is more difficult to explain. The level of compaction of the



Fig. 2 – Massive stone walls photographed upstream (photo B. Vogt).

Fig. 2 – Murs massifs de pierre photographiés en amont du cours d'eau (cliché B. Vogt).

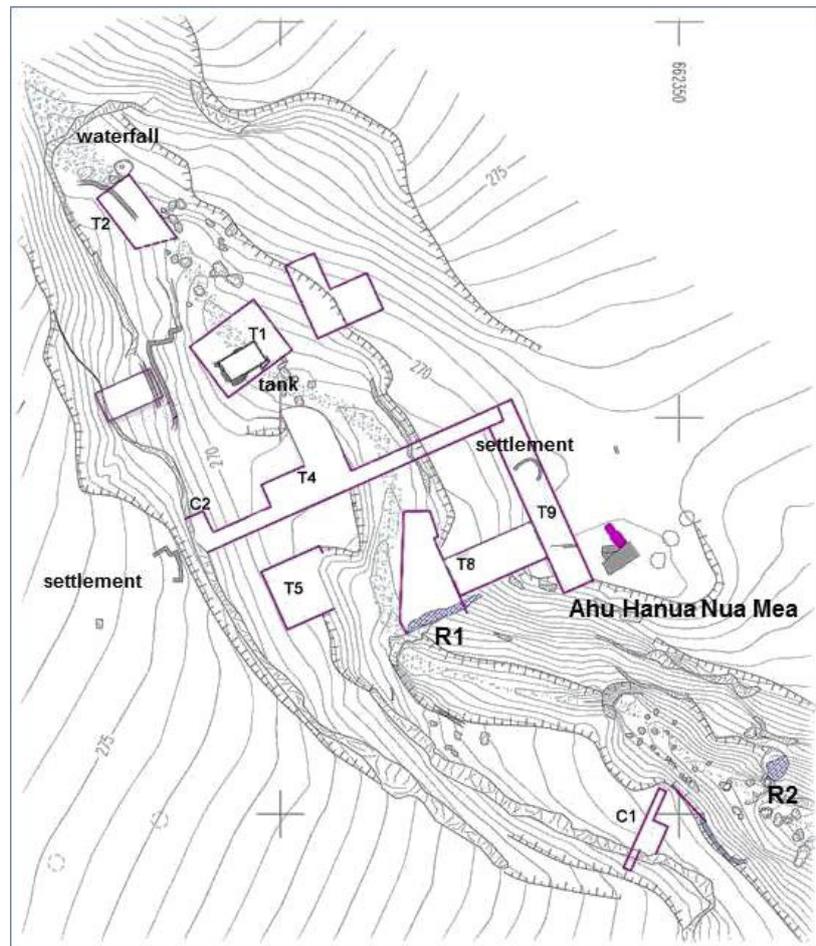


Fig. 3 – Map of the Ava Ranga Uka A Toroke Hau site. T: Trench; C: Cave; R: earthwork (map C. Hartl-Reiter).

Fig. 3 – Carte du site d'Ava Ranga Uka A Toroke Hau. T : tranchée ; C : grotte ; R : ouvrage en terre (carte C. Hartl-Reiter).



Fig. 4 – Succession of pavements and anthropogenic layers.
Fig. 4 – Séquence de dallages et de couches anthropiques.

sediment indicated that they were intensively used floors. The fact that they covered the pavement beneath points towards a possible ritual function through which layers of sediment were used to seal off prior structures and thus remove them from sight. This might be the manifestation of a certain kind of *tapu*, as proposed by N. Cauwe for some *ahu* (Cauwe, 2011).

A similar situation has been documented by N. Cauwe and his team from the excavation of Ahu Motu Toremō on the Poike peninsula. Here, a large ramp was built from sediment that was anthropogenically transported to the site for sealing off the underlying monument (Cauwe et al., 2006).

Pavements

The uppermost of the three pavements in the embankment profile was excavated over an extended area and displayed some outstanding features never documented before on Rapa Nui (fig. 7a). The pavement is elaborately laid and consists mainly of flat-lying stones. It is noteworthy that the vast majority of pavements on Rapa Nui occur in elite or ritual architecture contexts—namely in front of the *ahu* or the boat-shaped houses (*hare paenga*) of the chiefly families. This further contributes to the interpretation that the installations at ARUTH served a ritual purpose and were under the influence of the Rapa Nui elites.

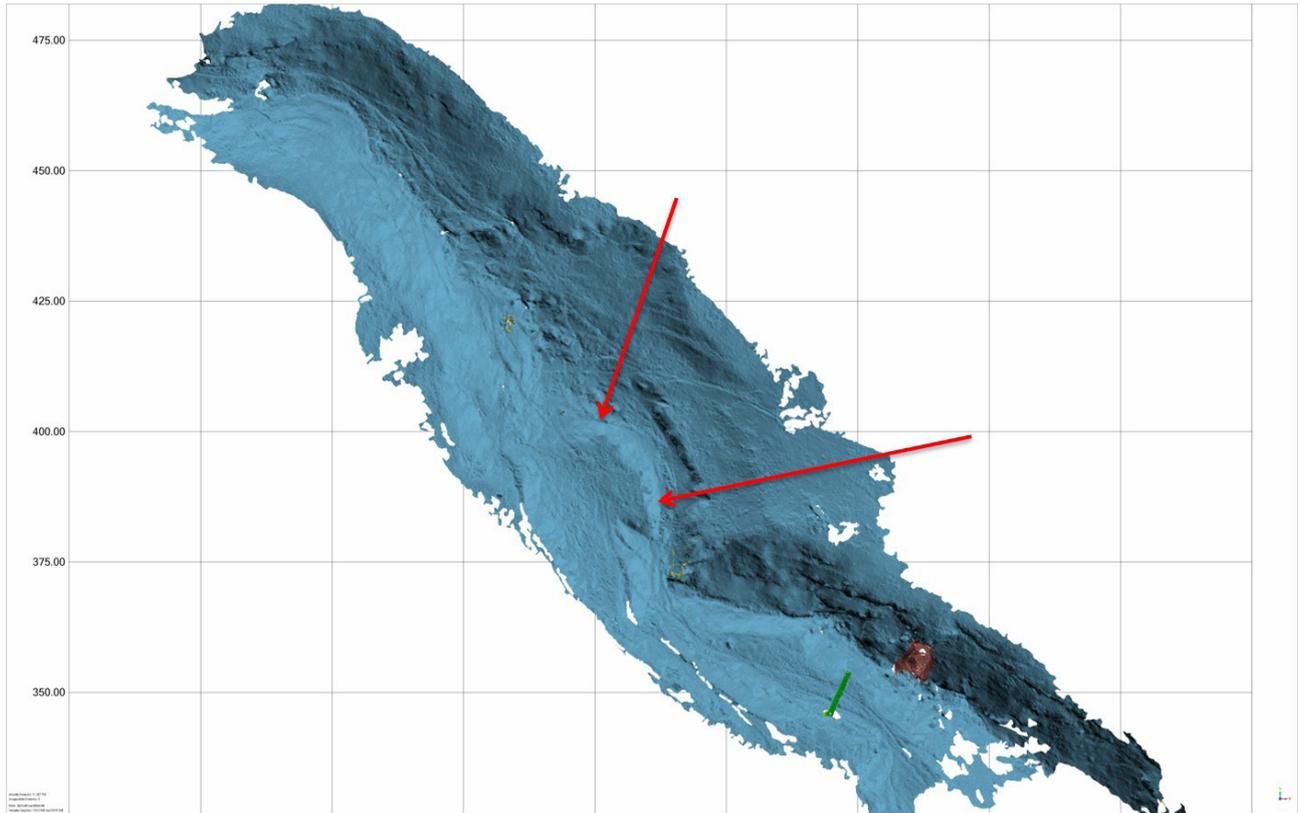


Fig. 5 – Man-made sediment island (scan HafenCity, University of Hamburg).

Fig. 5 – Île artificielle constituée de sédiments (scan HafenCity, université de Hambourg).

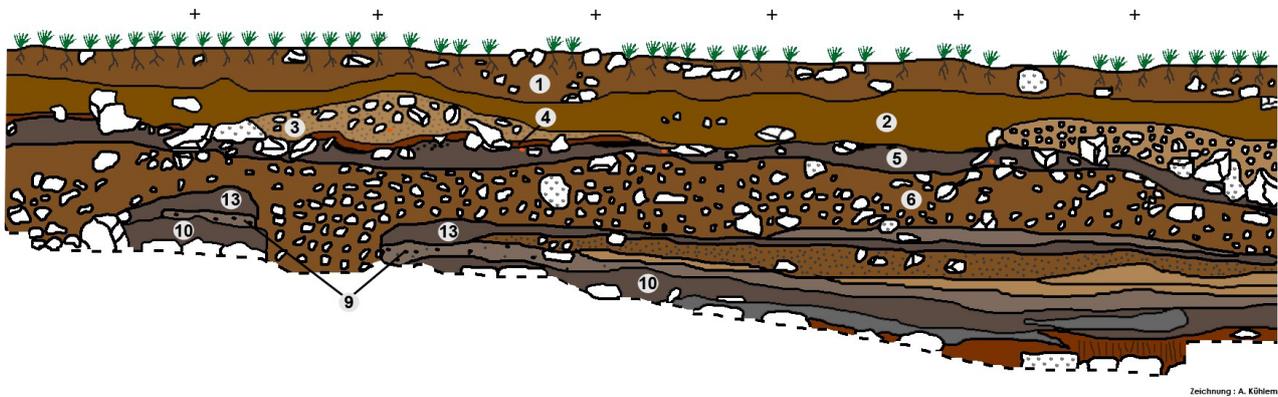


Fig. 6 – Profile of the central part of the site.

Fig. 6 – Coupe de la partie centrale du site.

Water canals

Amidst the pavement, two parallel canals were found. The grain texture analysis of the filling left no doubt that they were used for channeling water (Hans-Rudolph Bork, pers. comm., 2011). They are lined with big stone blocks and one of them is partially covered by stone slabs, probably to avoid evaporation. This canal seems to have run underground for some time. Stratigraphic evidence shows that after sealing off the pavement with the previously mentioned compacted layer, the course of the canal was

excavated in several places, probably to repair damages or clear obstructions. Since the amount of water seems to have been quite small during most of the year, it is possible that the entire efflux of the Vaipú creek was channeled in those anthropic canals, thus controlling the flow of water.

Palm tree planting pits

Besides these canals, the pavement yielded planting pits of a distinctly different nature than the ones in the upper layers. These circular pits are also evenly spaced and

stone-rimmed (fig. 7b). The filling shows small channels that have been identified to be the imprints of the roots of the now extinct *Jubaea* sp. that initially covered most of the island (Bork and Mieth, 2003; Mieth and Bork, 2004). Thus the pits could be identified as planting pits for palm trees. In the plaza of the neighboring Ahu Hanua Nua Mea, another such planting pit was discovered. Here it was carved into the bedrock and filled with garden soil that showed the same root channels. The fact that the palm trees were intentionally planted indicates that they formed part of the landscape transformation of ARUTH and that they were an integral component of the ritual architecture of the site. Most importantly, it demonstrates that the ancient Rapanui did not only cut down palm trees but also planted them. This indicates that the trees must have had a certain spiritual value and must have been cherished for them to be used in such a meticulously planned and structured ritual complex as ARUTH.

Nicolas Cauwe found further evidence for the planting of palm trees as a part of ritual architecture in Ahu te Niu. At this site, the planting pit displaying its diagnostic root channels was surrounded by a stone pavement as well (Cauwe, 2011).

The stone basin

Another indicator for the importance of palm trees was found inside a stone basin upstream of the paved areas in the center of the site (fig. 8a). The megalithic basin measures approximately 5 m by 2.75 m and has a maximum depth of 1.5 m. It is built with big well-fitted *paenga*-slabs and has a small annex in the eastern corner that conducted the water into the basin through a small triangular opening. The basin is founded on the bedrock of the riverbed that shows three petroglyphs: a double-hull canoe, a sea horse, and a footprint (fig. 8b).

A depression in the rock was covered with pavement. Under it, a sealed-off cache was discovered (fig. 8c). It contained offerings including three wooden awls and a

great number of plant remains such as twigs, leaves and seeds of calabash. The lithic inventory includes many beach pebbles (*poro*) as well as basalt and obsidian tools. Among the tools were various miniaturized basalt and obsidian *toki* of 3 to 4 cm in length, which are too small and delicate for having been used as percussion tools.

The most outstanding finds however were over 220 uncharred nutshells of the now-extinct *Jubaea* sp. palm tree (fig. 8d). Their deposition in the cache as part of the offerings shows once again the value of the palm trees for the ancient Rapanui. Moreover, they could be directly ¹⁴C-dated. The dates indicate that the basin was constructed between the late 15th and the early 17th century, at a time when the deforestation of the island had already reached its maximum extent (Mieth and Bork, 2004 and 2010) and when certainly the effects on erosion and soil depletion were already evident to the Rapanui.

Assuming that the nuts from the cache grew on the same palm trees planted on the site, ARUTH site would have been one of the last locations where palm trees kept growing as the rest of the island was already severely deforested. In that case, ARUTH could be interpreted as a sanctuary dedicated not only to water but also to palm trees, where the last of their kind survived.

‘CONTROLLING THE ELEMENTS’

The Rapanui transformed their island to a vast degree. The most impacting transformation was certainly the complete deforestation and all its subsequent effects on erosion and soil depletion. However, excavations in Ava Ranga Uka showed that other factors were part of this transformation and the control of the different natural elements:

- hydraulically active structures were built to retain and conduct the flow of water;



Fig. 7 – a: the pavement with canals and planting pits; b: detailed view of a palm tree planting pit with small root holes.

Fig. 7 – a : le dallage avec des canaux et des fosses de plantation ; b : vue détaillée d’une fosse de plantation d’un palmier avec des traces de racines.

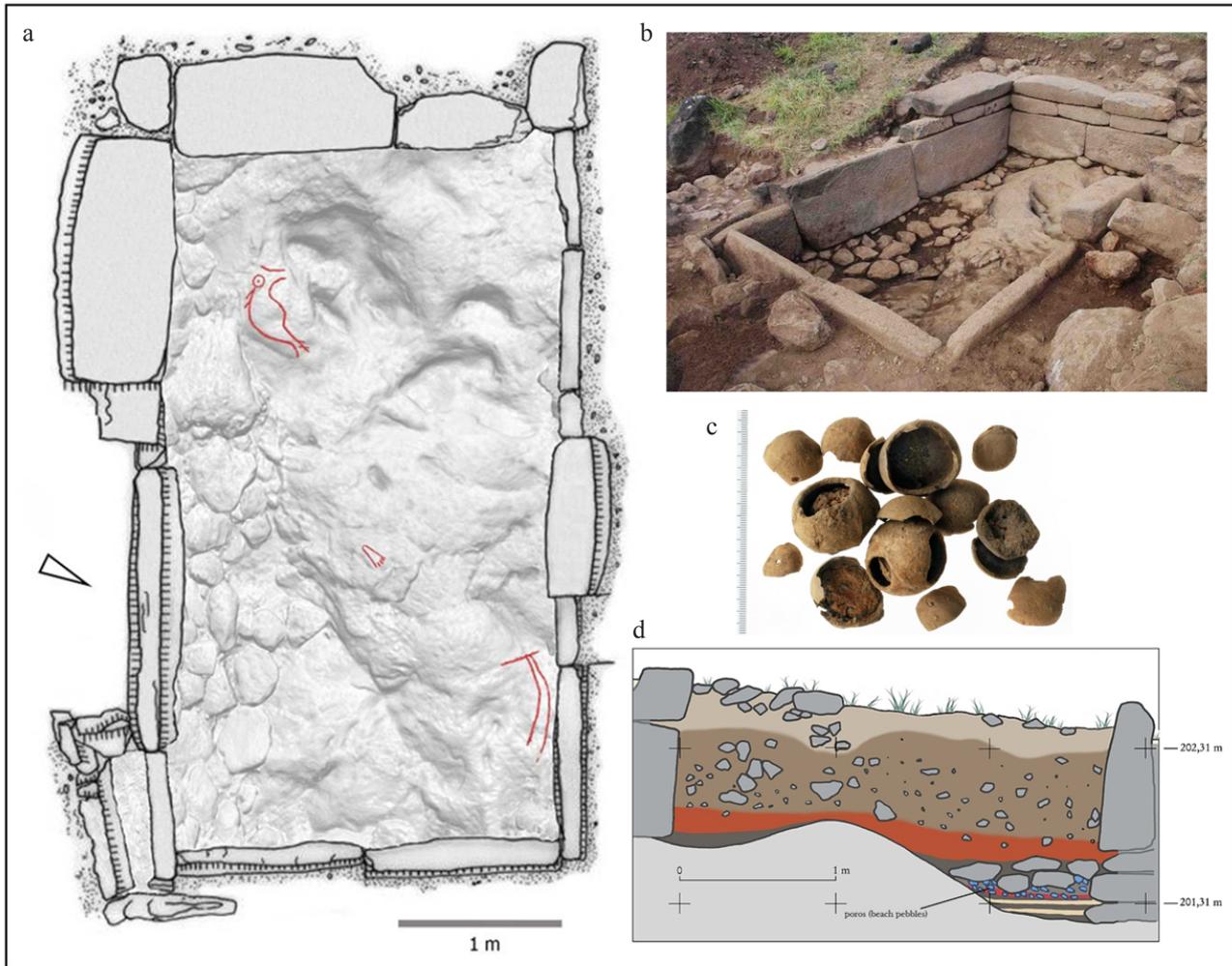


Fig. 8 – a: the megalithic basin; b: the petroglyphs at the base of the stone basin (scan HafenCity, University of Hamburg, drawing B. and M. Vogt); c: nutshells of *Jubaea* sp. found inside the cache; d: cross-section of the cache.

Fig. 8 – a : bassin mégalithique ; b : pétroglyphes à la base du bassin en pierre (scan HafenCity, université de Hambourg ; dessin B. et M. Vogt) ; c : coquilles de noix de *Jubaea* sp. retrouvées dans la cache ; d : coupe de la cache.

- extensive pavements were laid out, covering large areas; massive earthworks and new use-surfaces were created, for which large amounts of sediment had been moved, spread out and compacted;

- palm trees were planted as part of the ritual architecture;

- in the upper layers, garden crops were cultivated;

- numerous fire pits were arranged; some of them possibly for the production of pigment, undoubtedly affecting the fourth element—the air—in the valley of Ava Ranga Uka A Toroke Hau.

All the natural elements were controlled by the Rapanui in pre-contact times to a wide extent. While many aspects of this can certainly be considered active counter-measures against the effects of erosion and soil depletion due to the prior deforestation, there seems to also have been a ritual component that manifested itself in the creation of a new kind of water cult that was practiced at the site of Ava Ranga Uka A Toroke Hau.

A WATER CULT AT THE VAIPÚ CREEK?

Water was the dominating element at ARUTH. The location of the site in the center of the island and at one of the few seasonal streams highlights the importance of the site. The fact that water was a scarce and therefore certainly valuable resource makes it plausible that it was controlled by the elites and only accessible to certain people. Bearing in mind that in Polynesian societies limited resources were often placed under *tapu*, this might explain the absence of denser settlements along the course of the Vaipú creek. The water seems to have been reserved for special purposes. The existence of the Ahu Hanua Nua Mea as integral part of the hydraulically active structures in the creek bed is a further indicator that the site had a strong ritual component. Possibly, the installations constituted the architectural framework to worship Hiro, the Polynesian god of fertility. Ethnographic accounts relate how, in times of drought, the high priest went to the hills (the Terevaka volcano is the

highest elevation on the island) to conduct fertility rituals and pray for rain (Metraux, 1940, p. 330).

The water basin with its unique cache and the marine-related petroglyphs point towards the same interpretation that water was of utmost importance. The fact that palm tree nuts had been placed in the cache and that palm trees had been planted as part of the architectural ensemble highlights the significance of the *Jubaea* even—or especially—at a time when the effects of the deforestation must have been clear to the ancient inhabitants of Rapa Nui. In that sense the domesticated landscape of ARUTH can be understood as a sanctuary—for water and for trees—and as the setting for a unique kind of water cult.

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BIBLIOGRAPHICAL REFERENCES

- ATAM M. (2010) – *Desde el mito a la evidencia arqueológica: análisis de microrestos vegetales adheridos en artefactos de obsidiana*, licence thesis, Universidad SEK, Santiago de Chile, 186 p.
- BORK H.-R., MIETH A. (2003) – The Role of *Jubaea* Palm Trees in the History of Rapa Nui: A Provocative Interpretation, *Rapa Nui Journal*, 17, 2, p. 119–22.
- CAUWE N. (2011) – *Easter Island: The Great Taboo*, Brussels, Versant Sud (New Archaeological Discoveries), 160 p.
- CAUWE N., HUYGE D., DE MEULEMEESTER J., DE DAPPER M., COUPÉ D., CLAES, W., DE POORTER A. (2006) – New Data from Poike (Rapa Nui - Easter Island): Dynamic Architecture of a Series of Ahu, *Rapa Nui Journal*, 20, p. 31–36.
- CRISTINO C., VARGAS P., IZAUARIETA R. (1981) – *Atlas Arqueológico de Isla de Pascua*, Santiago, Corporación Toesca, 21 p.
- ENGLERT S. (1948) – *La Tierra de Hotu Matu'a. Historia, etnología y lengua de la isla de Pascua*, San Francisco, Padre Las Casas, 361 p.
- FASSBINDER J. W. E., BONDAR K., VOGT B., MOSER J. (2009) – Magnetometerprospektion und magnetische Eigenschaften von Basalt-Böden am Beispiel der Osterinsel (Isla de Pascua) Chile, *Metalla*, 2, p. 1–44.
- KERSTEN T., LINDSTAEDT M., VOGT B. (2009) – Preserve the Past for the Future: Terrestrial Laser Scanning for the Documentation and Deformation Analysis of Easter Island's Moai, *Photogrammetrie Fernerkundung Geoinformation*, 1, p. 79–90.
- KÜHLEM A., Hartl-Reiter C., Vogt B. (2015) – Landschaftsüberformung und Wasserkult auf der Osterinsel, in H.-J. Przybilla, T. P. Kersten and F. Boochs (eds.), *Denkmäler 3.de. Von Low-Cost bis High-Tech: 3D-Dokumentation in Archäologie und Denkmalpflege*, proceedings of the conference (Dortmund, 16–18 October, 2013), Hamburg, Labor für Photogrammetrie und Laserscanning, p. 53–59.
- MARTINSSON-WALLIN H. (1994) – *Ahu: The Ceremonial Stone Structures of Easter Island*, Uppsala, Societas Archaeologica Upsaliensis (Archaeologica Upsaliensis AUN, 19), 188 p.
- METRAUX A. (1940) – *Ethnology of Easter Island*, Honolulu, Bishop Museum Press (Bernice Pauahi Bishop Museum Bulletin, 160), 432 p.
- MIETH A., BORK H.-R. (2004) – *Easter Island - Rapa Nui: Scientific Pathways to Secrets of the Past*, Kiel, University of Kiel (Man and Environment, 1), 109 p.
- MIETH A., BORK H.-R. (2010) – Humans, Climate, or Introduced Rats - Which Is to Blame for the Woodland Destruction on Prehistoric Rapa Nui (Easter Island)?, *Journal of Archaeological Science*, 37, 2, p. 417–26.
- VOGT B. (2009) – Osterinsel: Wasserbau unterm Regenbogen, *Archäologie in Deutschland*, 4, p. 12–16.
- VOGT B. (2013) – Archäologische Forschungen zur voreuropäischen Wassernutzung in Ava Ranga Uka A Toroke Hau, Osterinsel (Rapa Nui/Isla de Pascua, Chile) 2007–2009, *Zeitschrift für Archäologie Außereuropäischer Kulturen*, 5, p. 7–45.
- VOGT B., KÜHLEM A., (in press) – By the Creek of Ava Ranga Uka A Toroke Hau – about Landscape Transformation and the Significance of Water and Trees, in S. Haoa Cardinali, D. W. Ingersoll, K. Butler Ingersoll and C. M. Stevenson (eds.), *Beyond the Moai. New Archaeological, Cultural, and Historical Perspectives on Rapa Nui*.
- VOGT B., MOSER J. (2010a) – Ancient Rapanui Water Management: German Archaeological Investigations in Ava Ranga Uka A Toroke Hau, *Rapa Nui Journal*, 24, 2, p. 18–26.
- VOGT B., MOSER J. (2010b) – Feldforschungen 2007 und 2008 auf der Insel Rapa Nui (Osterinsel/Isla de Pascua), Chile, *Zeitschrift für Archäologie Außereuropäischer Kulturen*, 3, p. 244–52.

Annette KÜHLEM
Kommission für Archäologie
Außereuropäischer Kulturen
des Deutschen Archäologischen Instituts
Dürenstr. 35-37, D-53173 Bonn (Germany)
annette@kuehlem.de