POSSIBILITIES OF USING AERIAL PHOTOES IN PREPARATIONS OF ARCHAEOLOGICAL EXCAVATIONS - MARITIME VILLAS ON THE EASTERN ADRIATIC COAST

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The integral land area of maritime villas on the eastern Adriatic coast has not been determined so far. The maritime villas were certainly in the category of luxury Roman villas and they have been situated on the promontories and bays with the most beautiful views to the sea. The area of the villas territory are partially known from limited excavations. Because the whole complexes cannot be archaeologically explored at the moment other methods of research have to be used as preliminary to classical archaeological explorations. Aerial photographs were analysed by means of computer processing by the method of linear histogram modification. These explorations indicated that more extensive building complexes on the all sites. The best resultsates should be in combination those methode with geophysical research, including electromagnetic detection of the sites.

The recent book of Xavier Lafon has defined the historical phenomenon of the *villa maritime*, considered *villae maritimae* only those villas that exhibit architecture on the shoreline in the direct contact with the sea (Lafon, 2001., 3-4). Maritime villas were the residences of Roman aristocracy and the centers of their properties on the coast. The political, economic, and ideological conditions were ripe for the birth of this architectural phenomenon on the eastern Adriatic coast during the first century. Maritime villas had been prestige projects, removed from production sites. The sea became an internal, desired space, embraced by floating porticoes. The architecture had been opened to the landscape. The topography of the Adriatic coast with rocky promontories and protected bays conducive to imaginative and exclusive architectural designs, which took off in the Augustan period and during the whole first century.

Agricultural intensification of cash crops, wine and olive oil, and exploitation of stone and salt caused the rapid transformation of the landscape and society, and lead to the great building activities, specially of large maritime villas.

August annexed Istria to Regio X, *Venetia et Histria*, between 18 and 12 B.C. As part of Italy the Istrian properties became freed of taxes levied on properties in the provinces. Most importantly, Augustus himself would have had direct interest in the Istrian economy and imperial estates were located in Istria (Starac, 1995, 139-140). Senatorial investments in Istrian cash crops and access to the new markets in Noricum and Pannonia (both military and civilian) were tied to imperial policies which, according to Tassaux (Tassaux 1982., 265), favored North Italy and Istria. Imperial policies and ēlite economic interests went hand in hand in the development of maritime villas in Istria, and they would have created economies of scale for a few members of the emperor's inner circle.

There are numerous Roman villas on Istrian and Dalmatian coast and also on the neighboring islands, but there are rather few real maritime villas. As there are rather rare and the most exclusive roman sites, we aim our attention to archaeological evidence and aerial photos of those villas. Bigining from the north part of the eastern Adriatic there are same maritime villas on the territory colony of Tergeste.

The first maritime villa is in the territory of Aegida, covered a low promontory, today called Katoro - golden house (Ca d'oro - *domus aurea*) and reached into two bays on either side. The position is panoramic with vistas on all sides. The site is only partially excavated. Some architectural remains of a high level were found on the top of the promontory - perystile, row of the rooms, massive terraces, and walls in *opus isodomum* technique. The building may be dated to 1th century. The baths were located in the north St.
Margaret's bay, while a large, semicircular *piscina* with compartments takes up the south bay (Gluščević, Bošec Ferri 2003, 116). The finds of architectural decoration, including marble revetments and polychrome mosaics indicate a high level of luxury. The villa was built for the purpose of *otium*. No evidence of agricultural production has been found. Monumental tomb with fine glass jug and pottery in *terminus post quem* end of 3rd - 4th century were find near the bath on site Tiola (Bošec Ferri, 2003). As a result of sea-action, occasionally partial ground plans of new premises with mosaics that frame the southern side of the peninsula appear. It is also visible on the aerial photos. The evidence of the walls on the both side of the promontory today under the sea. There are same evidence of the walls under the touristic complex Catoro (houses, restoran and gardens). There is also same evidence of big mole north of the St Margarita bay and north of Sipar which protect the whole bay from the north wind.

The second and the third maritime villas are in the territory of Parentium, present-day Porec. Two nautical miles south of the city, on a narrow promontory of Sorna, today within the touristic complex called Green Lagoon, a large villa (150 x 130 m) was excavated in the 1960's.

The villa straddles the promontory and long porticoes open to the wide vistas on all three sides. The axial symmetry of the two peristyle complexes indicates a unified design, not a two-phased development (Matijašić, 1999., 126). A large *triclinium* is centrally located at the highest point of the promontory. The light comes from the peristyles on each side. In the east bay close to the sea there is the bath. Fig 9 The rooms decorated in polychrome mosaic, and wall paintings dated to between 1th and 2th century have been excavated. The structure in the lower left corner (no. 12) was added in the 4th century, according to the excavator. There were no signs of agricultural activity in the excavated areas or in the vicinity. Here we may truly have an imperial-period villa built for the purpose of *otium*. In the second phase, in the center of the building, a small rectangular construction was put up with lateral additions, very likely a church. On the aerial photos there are same more evidence of the walls on the south side of the promontory.

Four nautical miles north of Parentium, a large, productive estate was spread over two bays Santa Marina and Cervar and a promontory between them. In the bay of Cervar-Porat, was located the second largest amphora workshop in Istria, active from the 1st to the 4th century. It also produced *terra sigillata* and tiles early in the first century. The senatorial owners, Cornelius Sisenna, Statilius Taurus and Calvia Crispinilla, are confirmed by stamps on sigillata, amphorae and tiles. Under Domitian, this workshop as well at the one owned by the Laecanii became imperial property. The fate of the other properties of these families is unknown. It is possible that their maritime villas also fell into imperial hands. Two fragments of black and white mosaic, clearly parts of a large area, deriving from the locality of Loron is now exhibit in Poreč museum. The framing border, which enters the field of the mosaic, a white ivy leaf on a dark background in the corner of the composition, and the two strand white guilloche on a dark background are typical motifs of mosaics of the Flavian era, of the end of the 1st century (Meder, 2003., 29). Kilns and buildings with oil presses were excavated in the 1970's on the south side of the bay.

Recent Franco-Croatian excavations on the north side of the bay, at Loron, have uncovered further production installations. A structure with a long row of rooms on the shore and more structures on the slope, one with a hypocaust have been excavated so far (Tassaux, Matijašić, Kovačić 2001., 89, 312). Fig 1 A maritime villa connected with this production site has been located at Loron, but is awaiting excavation. Walking for over 500 meters along the curving shoreline and on the slopes of the promontory between the bays, one can see evidence of dispersed buildings constructed both at sea level and on terraces. On the aerial photos is possible to see a *piscina* which has been located at the end of the second bay. There is also visible same walls on the promontory and in the bay Santa Marina. The site has been recently published. In Istria on the north of Pola, there are three large sites, one on the coast at Barbariga, second on the island of Veli Brijun, and the third just across, on the coast at Valbandon.

At Barbariga, 4.5 nautical miles north of the *figlina* in Fazana, was located the largest known oil producing estate in the early imperial Istria. Of the four production sites located within the 2 km2, one had 5 presses, another 20. The latter site contained remains of a *fullonica* and ground murex shells dating from late Antiquity.

A maritime villa, sprawling over a promontory, seemed to have been the luxury residence of this estate (Schwallb, 1902., 21). The villa plan on the screen shows three interconnected buildings ending in a mole and the harbor area. The oldest part of the villa is the southern wing. Most of the pavements are white with two black framing borders, while the rest are blak with one or two white borders. The first building may well be the original platform villa with a frontal portico, comparable to Lafon’s Type B, to which prestige buildings
with mosaics were added. The villa is dated to 1th century. The peristyle was left open to a panoramic view on the seafront and both facades were embellished by monumental stairways. Row of the rooms situated on the three side of the peristyline contains black and white mosaics with geometrical motifs and polychrome mosaics. Among the remains are two preserved fragments of frescos that are ascribed to the 3rd Pompeian style (Meder, 2003., 44). The thermal facility also belongs to the later construction phase. This site was excavated early in the 20th century and re-excaitage is needed to clarify the phases. On the aerial photos there are same evidence of the architecture under the sea in front of the villa and of same walls on the not side of the villa.

Maritime villa on Brijuni, the most elaborate maritime villa known on the eastern Adriatic and probably owned by the Laecanii, together with the entire island. We need to bring it up here as the only site where the late republican to early imperial building phases are clear. Verige-villa rustica plan and residential area-reconstruction In a picturesque bay of Verige, we see a “Catonian” villa with a pars rustica and pars urbana, transformed into a terraced maritima, with a new domus and monumental porticoes touching the sea. The original villa was a combination of Lafons’s Type A with a central courtyard and Type B, a platform villa with a frontal portico. Fig 2 - Overall plan and aerial photo

Eventually, in the course of the first century of our era, the entire bay was built with monumental amenities, covering over 6 hectares. The original pars rustica remained operational, while another large agricultural complex was established on the other side of the bay. Villa have had a whole range of long colonnades open to the sea and a peristyle courtyard around which buildings are grouped. The buildings served different functions - residential, religious (temples of Neptun and Venus, and nymphaeum), library, palaestra, bath, all interconnected by colonnades and pergolas A semicircular colonnade follows the shoreline which had a stonebuilt waterfront (Begović Dvoržak, 1990, 98). Villa encompassing three varied kinds of landscape: a naturally sheltered bay, slopes of a three hills and gentle surrounding meadows. A rectangular piscina in a way connects the monumental baths with that production area. Contrary to Lafon’s observations for most of the early imperial maritime villas in Latium and Campania, we do not see here that production was moved away when monumental parts were added. Display agriculture and pisciculture remained an integral part of this high-power retreat (Schrank, Begović, 2000, 257). Digital processing analysis of aerial photographs have indicate the areas which should be further explored. That include the area in front of the western entrance of the residential building, the area near the large cisterns on the fourth terrace of the same part, the eastern part of terraced gardens on Dubovac hill near the lateral piers, the area behind the temples, the area behind a large portico on Gradina hill, the area north of the bath and the marginal part of the outhouses on the slopes of Mrtvì Vrh (Hudec, Begović 1993., 81-83)

The villa in the deep bay of Valbandon was partially excavated early in the 20th century and only new excavation could clear its chronology and the relationship between the two parts on the opposite side of the bay (Matijašić, 1999., 122). Imaginative architectural forms and the finds of high-quality decoration, including a floor in opus scutulatum indicate a luxury residence. In the southern complex, almost all the residential areas were decorated with mosaics. North east of the complex are the farm buildings, linked with the others by a mosaic-covered passage. Two exedras in the northern part of the bay are decorated with black mosaic with crustae. Behind them lies the northern wing of the residential part. Alongside the mosaics are the remains of decorations of marble plates opus sectile. Olive oil production has been confirmed in the area by the finds of several press fragments, but the relationship with the villa cannot be confirmed. There was evidence that the inner part of the bay was enclosed to form a piscina, which was fed by a creek that flowed into it. The complex is dated to 1st century. There is also some renovation of mosaics from the late antiquity (Verzar Bass, 1986.,656). The remains of the fullonica that belonged to the estate extend as far as Cristo Point. Further assessment of the productive or leisurely function of this villa must await full excavation. On the aerial photos there is visible the fill up bay of Valbandon. The archaeological excavations should treated the whole parts of the bay.

The land south of Pula forms the southern tip of Istria. It is low, with promontories and deep bays. The resources are stone, agriculture and sheltered bays. The quarries of good limestone are located from north of Banjole to Premantura. The evidence of oil production was found at five sites, including the partially excavated maritime villa of modest size in a cove at Banjole (on the right screen). The building phases are not known, but the plan reveals an original farm with a frontal portico expanded toward the sea. On the aerial
photos, there is visible, in the bottom of the bay and on the nort side of the bay, same evidence of the architecture. It have to be investigated in archaeological excavation.

East of Banjole, by the present-day town of Medulin, the largest maritime villa in this area, and perhaps the largest one in Istria, occupied most of the promontory of Vizula.

The promontory is located in a deep bay, which offers safe anchorage and protection from all winds. Crossing the open sea between the tip of Istria and the island of Unije is very dangerous under the north wind bora. Ships sailing up or down the Adriatic need to wait in a protected area during such conditions. Fleets would winter in such safe bays. The villa had a panoramic position and would have had a visual control of the straits leading into the bay.

Since 1995, the remains on the promontory and submerged structures have been surveyed. Several small areas have been excavated. Visible walls stretch for a kilometer along the shores and some are now submerged. Various buildings are arranged at different angles. The whole villa, built on three terraces, covered about 10 hectares (Đzin, 1995., 75, 77). The size and layout with dispersed structures are comparable to the imperial villa at Pausilypon by Naples, which covers 9 hectares. Portions of long porticoes and loggias with mosaic floors have been uncovered, like on the photo here, at a point where a monumental stairway connects terraces. Finds of mosaics, marble and statuary indicate considerable luxury. Small finds date the complex from the 1st to the 6th century. Some investigated structures showed partitioning in late antiquity, perhaps to house an increased population, possibly military. On the aerial photos we can see into the bays on the both side of the promontory Vizula the protected harbours and may be piscina vivaria. Also it is visible that the shore had been built around the whole promontory in irregular rectangular shape. On the slope of the hills there are same evidence of terraced architecture.

Our research in the Adriatic region south of Istria showed a different picture. First, the area had a different political and economic position in the Roman state. It remained a provincial territory of Illyricum, which Augustus removed from the senatorial provinces and established as an imperial province.

Villas in the southern half of the Adriatic are better known overall, both from excavations and publications, as seen on the map (published by Marin Zaninovic in 1995). True maritime villas are however rare. We shall discuss five villas from this area. They were chosen for their special features or functional significance.

The first one is maritime villa in the bay called Stari Trogir, 22 nautical miles west of the colony of Salona and 12 nautical miles west of Tragurion. Pliny the Elder mentioned Tragurion as “marmore notum.” The quarry was exploited from the time of Greek colonization in the 3rd century BCE into the Renaissance. The villa may be connected with that activity, it but also lies in an agricultural area and in an important nautical location. The bay is well protected from all winds and a small island in front of it provides further protection. It is also at a point where ships sailing from Salona up the coast would leave the channel and go into open waters.

The site has been surveyed but never excavated. The remains of a stone quay and a circular structure are visible in the sea (Kirigin, Marin, 1989., 123-124). This circular structure of 8 m in diameter may be part of a piscina with a central circle framed by lateral rectangular compartments, known from the maritime villas north and south of Rome, illustrated by Lafon. Most date from the Augustan period. On the beach there are remains of the baths and a large cistern, divided into two compartments. A circular tower was built in Byzantine times on top of the baths, when the villa probably had the most strategic significance. More walls are visible on the slope, as the villa was raised on two terraces, nested in the semicircular shape of the bay. On the aerial photos it is possible to have a presentiment under sea, the harbour of the villa and big mole which protect the bay from the south wind.

Further south on the coast, six nautical miles south of present-day Dubrovnik, was the Augustan colony of Epidaurum. Its Croatian name Cavtat derived from Latin Civitas. The suburban area was covered with vineyards and olive groves until the late 19th century. Two suburban, maritime villas have been located on each side of Epidaurum, one across the bay on the Sustjepan promontory, the other one on promontory of Rat 100 meters from the Epidaurum harbor. The bay of Epidaurum are protected from the sirocco and the bora and provide good anchorage. Epidaurum was an important port on the shipping line between the Ionian and Adriatic seas and in the trans-Adriatic network.
The villa on the Sustjepan promontory was partially excavated in the early 1970’s. It spread over three terraces with porticoes on the first and second. Along the shoreline were remains of a cistern, storage rooms and a mole (Zaninović 1988., 93). These would indicate that some agricultural production occurred on the site, although none has been confirmed. Thirteen skeletal burials of the mid-late 6th century were found within the walls of the lower portico. Fig 3 On the aerial photos there are same evidence of other terraces of the villa lay close to the sea.

The villa on the Rat promontory is not very far from the Račić mausoleum (made by Meštrović). The villa is located close to the sea. There are archaeological excavations now on the villa site (R. Menalo, 2003.). On the aerial photo we can see same evidence of staircase and villas terraces.

There are two island villas on Korčula and Mljet. The first one is maritime villa at Lumbarda and its location and masonry are notable. It was located on a promontory, on an elevated, panoramic position, at Lumbarda on the island of Korcula, between the two bays named Bili Žal and Pržina. In the bay Bili Žal have been find some architectural remains, the harbour and the part of the villa. The site controls sailing in the Peljesac channel and the route to and from Narona. The villa also sits at the edge of a fertile valley, still today renown for its vineyards. The site has been surveyed, but not excavated. The layout shows two rectangular buildings (29 x 25 m and 27 x 24 m) connected by a 93 m long, seafront portico 4.66 m wide (Zaninović, 2001, 151). One stretch of exposed wall is built in opus reticulatum, a technique rare in the eastern Adriatic and outside of Italy in general. Xavier Lafon has discussed the rare appearance of this building method in maritime villas in provinces and saw it as an indication of property value and of high position of the original owner in relation to Rome. In Italy, this opus is always used in monumental villas, mostly in Augustan or early imperial age. Lafon further quoted Torelli’s argument that provincial use of this opus was for public architecture and that domestic usage was exceptional. We may have at Lumbarda a villa of an equal status to public architecture and built not only by a Roman architect, but also by Roman masons. We can compare it to the maritime villa in Fornace near Piran (Stokin 1992., 79). Was the “grand cru” of this island or its strategic position the reason for this high-power estate? Apian writes that Octavian occupied Korcula and the neighboring island of Mljet (where our next villa is located) during his campaign of 35 -33 BCE and killed and sold into slavery their inhabitants (Illyr. 16). On the aerial photos we can see that the today roads across the field have outlined the outside shape of the villa. It also seems like the whole promontory had been compartment on the position of the villa formed the isolated space for villa's exterior.

The next site is in the same general area, on the north side of the island of Mljet, facing the Peljesac channel. Now safety rather than control governed its location at the bottom of a deep bay, its entrance protected by a line of small islands. There are two maritime villas in the bay: an early imperial and a late imperial. The village is now called Polace, from Latin palatinum. The early villa has dispersed buildings and only parts of the baths with mosaics have been investigated (Zaninović, 1990., 730). There was a creek flowing into the bay, which would have supplied water to the villa, the baths and perhaps a piscina. The later villa, built in the 5th century, is a compact, two-story cross-shaped building with polygonal corner towers. Walls are in parts preserved up to 20 meters in height (Fisković, 1999., 63). Documentary evidence tells us that in 489 king Odoacer gave the entire island, then an imperial estate, to his high official Pierius as a payback for his loan. Pierius was the likely builder of the villa, which has been suggested to function as his hunting lodge. Underwater finds in the harbor showed the luxury character of the site from the first to the sixth century (Brusić, 1988., 139-142). Its military function in the 6th century is attested by North African and Phocaean Red Slip Ware and by North African amphorae. Pottery and architectural evidence indicate that several maritime villas, possibly state owned, became in late antiquity fortified settlements and probably military and flotilla bases and commanders’ posts. From the aerial photos we can recognized same structures under the sea on the position of early imperial villa. Around the late antiquity palace there are visible same structures which can possibly belong to late imperial and early medieval settlement. On the left side of the bay there are same terraced space may be connected to the villa. The underwater archaeological investigation and excavations on the land will probably confirm this facts.

The maritime villa is possible villa on island Murter. The island lays close to the mouth of the river Krka (Titus) flows into the sea, not far from the ancient Scardona. Murter is called Coletum in view of Pliny’s quote (Nh III, 140). Villa is situated on peninsula with long porticoes and row of the rooms facing the sea (Faber, 1998., 114). The villa from the 1th century is only partly excavated. The long porticus, ten rooms (one with apside), big cisterna (10 x 5.5 m, 1.8 m high) and thermae, which have been excavated on the beach, indicate the luxury villa with panoramic views. The medieval name for this site is Villa magna.
The areal photos have indicated larger site on the both side of today archaeological evidence. Even the harbour and same other parts of the villa possibly had been situated in the bay south of the promontory.

The development of the true maritime villas did not occur until the development of an economy, especially an economy of scale. This is quite clear on the territory of Istria. The economy of scale was based on producing vine and olive oil which had been distributed all over Roman empire (well known naval route and Roman roads). The identity and activities of local senatorial landowners are known from literary and documentary sources. The second factor was the growth of political power base first in the community and then, even more importantly, in Rome. Maritime villas of the early Empire in Dalmatia may belong to high officials sent directly from Rome, rather than to local, Roman elite.

Digital processing analysis of aerial photographs have indicated the areas of the maritime villas which should be explored. A reading of the aerial photographs by using the method of linear histogram modification indicated the more extensive building complexes on the all sites. The best resultates should be in combination those methode with geoohysical research, including electromagnetic detection of the sites. The classical archaeological excavations will be the lates and the most important activity to chak the preliminary results. Using aerial photos in archaeological investigations is non-agressive method of archaeological explorations recomanded by Europian Concil for preservation of cultural heritage.

FIGURES

Brijuni
Cavtat

Loron

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