

THE LIMEKILNS AND ASSOCIATED STRUCTURES ON ÎLE AUX AIGRETTES, MAURITIUS

THE 2003 STUDY



Ile Aux Aigrettes from the air in February 2003. (ma03jv0318)

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This Report stems from a study made by the authors, with the help of three volunteers from the Earthwatch Institute, on February 11 2003. We are very grateful to Pierre Baissac, Director of the Mauritius Wildlife Trust, for inviting us to make this brief study and to the staff of the Wildlife Trust at Ile aux Aigrettes for making us welcome.



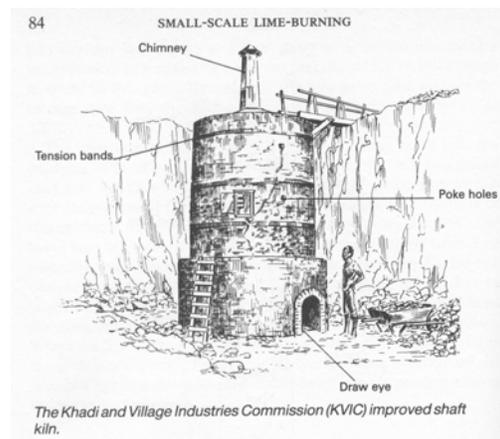
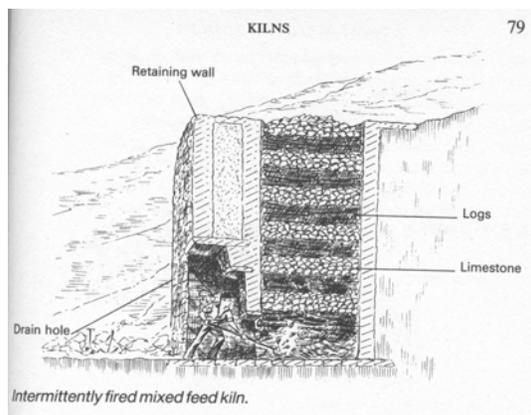
Geoffrey Summers stands on the remains of the spiral staircase that was partially bonded into the outer basalt face of Kiln I. Kiln 2, largely in shadow, was built against this staircase. The vegetation, although attractive, is destroying these structures. (ma03jv0201)

The purpose of this brief research was twofold. The first aim was to document the nature, extent and condition of the remains in a preliminary fashion, and the second was to make recommendations regarding plans to restore the two limekilns so that they form an additional feature within the guided tours of the extremely important nature reserve. In this last respect it is perhaps apposite to comment that the importance of these kilns extends beyond their own inherent qualities and visual attraction because their use provides physical documentation of a period of severe human impact on the vegetation of the island. In addition to its primary use for mortar in building before the large-scale importation of Portland cement, lime was of great importance in the history of the Mauritian sugar industry.

Introduction

The terminology used in this report has been taken from *Small-scale Lime-burning, a practical introduction* written by Michael Wingate and published by the Intermediate Technology Group, London, in 1985. According to Wingate's classification the two limekilns on Ile de la Passe are of the type known as "Running Kilns" or "Draw Kilns". They are essentially cylindrical draft kilns that were used for continuous production. The chambers were filled with alternate layers of wood and fossilised coral. As the wood burns the coral is converted to lime and falls to the bottom where it is drawn out through the Draw Hole or Eye at the base. As the level of material in the kiln drops more alternate layers of fuel and stone are added from the top. Because wood was the fuel used in these kilns the lime-burner did not have any particular difficulty in controlling the temperature of the kiln. As the material inside the kiln settled down it could become trapped and form an arch. When this happened the operator would break the arch by poking the stone through the Poke Holes.

Kilns of this type could be kept burning for up to a year before being allowed to run down and emptied for repairs. On Ile aux Aigrettes it is highly probable that the extent to which the kilns were used and the amounts of lime that were produced would have been directly influenced by the availability of wood for fuel. It is known that a plantation of Filaos was established on the island for this purpose.



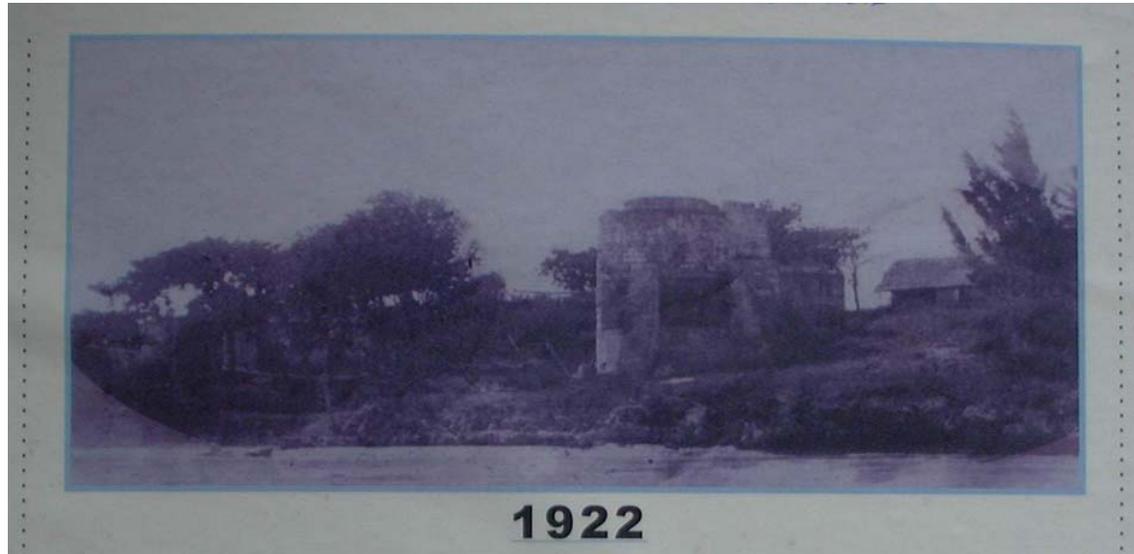
*Diagrams showing how kilns of this general type were loaded and operated.
From Wingate 1985 p.79 and p.84*

Generally kilns of this type were built into hillsides so that freshly quarried stone as well as fuel could be easily transported to the top of the kiln from where it was fed in as and when required. In Mauritius, however, the only suitable stone for making lime is fossilised coral, the occurrence of which is restricted to the low coastline and islets. On Ile aux Aigrettes, the kilns were completely freestanding. In order to continuously feed the kilns stone and fuel was carried up flights of stone steps that were designed and built for that purpose.

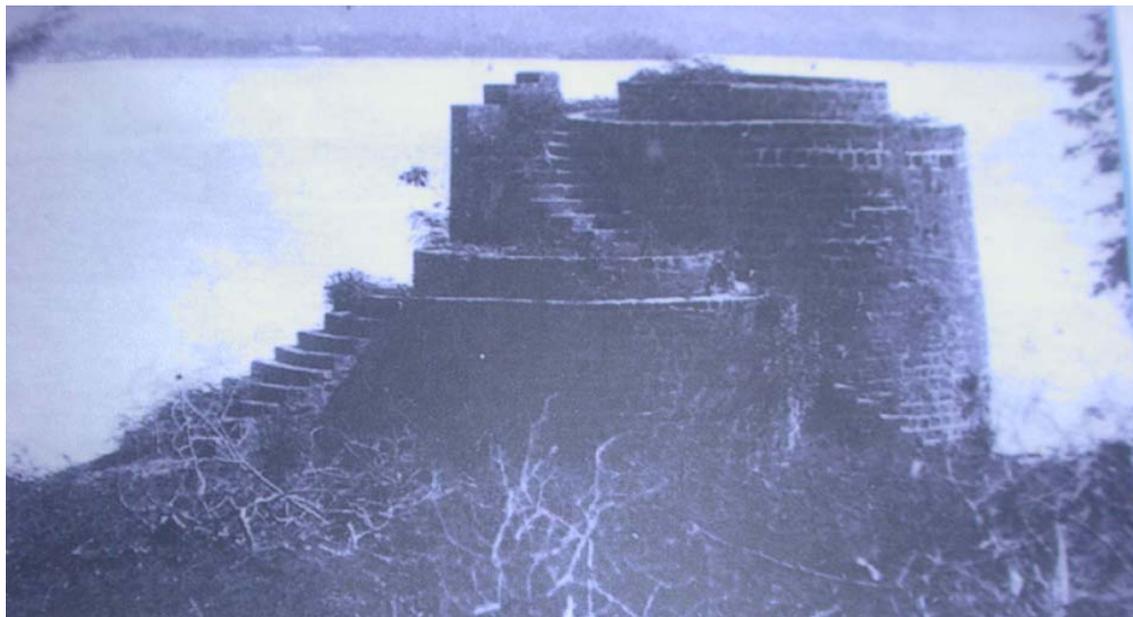
The Ile aux Aigrettes kilns were partially demolished when much of the basalt was removed for use elsewhere on the island in WW II.

Archival Records

The only records known to the authors are three photographs of the kilns acquired by the Wild Life Trust. Copies of these pictures are on a display panel at the site. One, taken in 1922, has two other structures in the background. The two other snapshots date to 1941.



This picture of the kilns, the earliest known, is on a display panel at the site. Structure 2, which now serves as quarters for the Wildlife Foundation, can be seen to the right and the ghost of Structure 3 is visible at left. This picture provides evidence for the two large dark features on the seaward side. (ma03jv0220)



This photograph of the Limekilns in 1941 is displayed on the information board at the site. The earlier Kiln I has a spiral stair. (ma03jv0223)

Overview of the Structures

Structure 1, the Limekilns

Structure 1 comprises two conjoined kilns located close to the edge of the island only a few meters distant from the modern jetty. The early photographs show that both kilns were standing at the same time.

Kiln I

The taller and more elaborate of the two limekilns, Kiln I, was built first. It comprises a tall kiln enclosing a cylindrical inner chamber. The external diameter of the kiln is some 6.00m. A broad (1.38m) spiral staircase extends around slightly less than half of the circumference and is partially bonded into the kiln face. Because the profile of the kiln has a slight sinuous taper, shallow rebates were used in the outer side of the staircase in order to maintain a constant width and similar profile. The end of the staircase also acts as one of two large buttresses on the seaward side. The old photographs show the existence of a higher parapet wall with a stepped top. This wall is no longer extant and it will require further study in order to determine precisely how this transformation from staircase to buttress and parapet was achieved. It also seems possible that the parapet wall represents a later modification to the original structure. If the uppermost walling was indeed added at a later date this would partially explain its complete disappearance.



The upper part of Kiln I showing the manner in which the upper portion of the staircase was transformed. The basalt face of the kiln can be seen emerging from behind the remains of the spiral staircase. (ma03jv0209)

The base of the kiln is constructed from blocks of fossilised coral, the outer faces of which were carefully cut to the correct radius. Above this coral footing the outer face stones of the furnace itself were of medium sized basalt stones which were roughly trimmed square and are laid in level courses. For the most part this basalt facing has only been preserved where it is protected by the staircase. As to the staircase itself, the treads were made of cut basalt. New copies of the 1941 photographs might reveal more precise details of the original masonry.

The 1922 photograph clearly shows two large rectangular features on the seaward side. Study of the 1922 photograph seems to reveal, in so far as it can be understood, that the feature extending between the two buttresses is fact black basalt facing of the kiln wall, above which the facing stone was, apparently, coral. The second feature is apparently a recess and probably indicates the position of the draw hole as shown in the diagram on page two. If this is in fact the case, it would mean that lime raked out from the kiln could be dropped directly into some kind of receptacle.

The first buttress is constructed of coral and is bonded into the furnace wall. The 1922 photograph shows that this buttress did not extend to the top of the furnace but ended on a level with the tops of the recessed features on either side. The width is 1.15m. There are thus a number of outstanding problems in correlating the extant remains with the evidence of the photographs. The most likely explanation for these discrepancies is that the recesses represent repairs to the face of the original kiln wall.



Kiln I. The first buttress is constructed of coral and is bonded into the furnace wall. The 1922 photograph shows that it did not extend to the top of the furnace but ended on a level with the tops of the recessed features on either side. The width is 1.15m. (ma03jv0311)



Kiln I Butters 2 is also the end of the spiral staircase. The butters itself is completely preserved and it can be seen from this image that it is generally butted against the basalt facing of the furnace although the two have occasionally been bonded together – showing that the butters and the spiral staircase were an integral part of the original design rather than a later addition. (ma03jv0305)



The junction of Kiln I wall and Buttriss 2. Note that the lower face stones of the kiln wall, which are probably at the level of a foundation below the base of the chamber, are made of cut coral blocks. Above these blocks the face was mostly basalt. The basalt was robbed in WW II. Two basalt lined, tapering, poke holes can be seen in the kiln wall. The buttriss, at right, also forms the end of the spiral staircase. It can be seen that some attempt was made to bond the buttriss to the kiln wall but for most of its height the buttriss is simply butted. (ma03jv0306)



The springing of the arch under the staircase of Kiln 1 is partially preserved. (ma03jv0213)

The kiln wall is some 1.35m thick and the interior diameter of the kiln is approximately 3.30m. The interior was lined with rectangular basalt stones that appear to be somewhat larger than bricks. In that large portion of the kiln where the wall is still intact the lining appears to have survived, although the surface of the basalt has partially vitrified.

Kiln 2

A second kiln was constructed against the first, so that it does not form a complete circle. Two gently rising, straight, staircases, one of which is seen in the 1941 photographs, also functioned as buttresses. The draw hole is partially preserved but no other features are readily apparent.



The wall of Kiln 2 butts against the stairs of Kiln 1. The steps and lining of Kiln 2 have been robbed. The basalt facing of Kiln 1 is preserved behind the staircase from which it protrudes. The springing of the basalt arch beneath the stairs can be made out to the right of centre at the bottom of the picture. (ma03jv0211)



The splayed draw hole of Kiln 2. The slightly pointed arch is constructed of uncut basalt stones set on edge. The internal iron lintel is heavily corroded. (ma03jv0212)

The Kiln 2 draw hole is reasonably well preserved, although the original face is now lost and the lower part is currently buried. None of the original lining is visible and it is not known whether it has fallen or was robbed in WW II. There is no reason to suppose that the lining was made of any material other than basalt and it might be expected that some of the stone remain *in situ* at the base of the chamber.

Other features

A corner of rather rough walling adjacent to the caves on the landwards side of the kilns can be seen. This structure is unlikely to have been more than a rude shelter and there is little prospect that cleaning and excavation would reveal further remains of it.

Structure 2, the Wild Life Trust Quarters

No attempt has been made to study the main building complex that was associated with the operation of the kilns and which has been refurbished to accommodate Wild Life Trust Staff.

Structure 3, Building Remains

Extant coral walls can be seen a few meters to the southeast of the kilns. The structure is partially obscured by a WW II concrete platform of the type found elsewhere on the island and also on Ile de la Passe. The earlier structure comprises a large rectangular room to one side of which two small rooms have been appended. No other features are apparent. It is assumed that this building was some kind of depot or store for both fuel and for dried hydrated lime. A measured sketch has been made of the visible walls.

Archaeological Assessment of the Structures

Structure 1: The Limekilns

The kilns are founded on the coral bedrock and, so far as can be seen, there is very little if any archaeological deposit associated with their operation. It may be observed that the base of the kilns is obscured, but the material against the outer face of the walling seems all to have derived from the robbing of the stone facing and subsequent decay, rather than from their operation.

As to the interior, removal of the fill of the kilns might very possibly reveal important details concerning both their construction and methods of operation. Furthermore, the cleaning of Kiln I might uncover the inner side of the draw hole, which would establish its position, and could perhaps also resolve some of the problems that have been encountered in attempting to identify and explain some of the features that are seen in the early photographs. Excavation should also provide evidence reflecting on the length of time that the kilns were in operation and might also reveal the extent of any possible repairs and modifications that are not now apparent.

There are certain problems that need to be addressed before any reconstruction is attempted. The first and perhaps the most difficult of these is the draw hole of Kiln I. The approximate location of this feature can be easily established and emptying of the interior might very well reveal the inner side, but its precise form has been lost and, unless other photographs are found, any reconstruction will of necessity be conjectural and will have to be based on extant examples at other sites. A second problem that will need to be addressed concerns the form and function of the arched recess in the Kiln I staircase. One side of the springing of this arch remains and the entire feature can be made out in the old photographs. An additional problem will be determining the extent of the basalt and coral facing, a task that will need to include careful study of the photographs. None of these problems are, however, insuperable.

Structure 3

It can be determined that two smaller rooms were added to the large building. Beyond that there seems to be little chance of determining the dates at which the various elements were built, nor of discovering their function. There do not seem to be any deposits associated with their use, bed-rock being everywhere on or very close to the surface.

Dating

From a strictly archaeological point of view there does not seem to be very much material that could perhaps provide a clue as to the date of the structures (e.g. pottery or glass). Nor do there appear to be any areas where such deposits might be found. This in itself might be taken to suggest a date no earlier than the late nineteenth century for all of the structures. The somewhat superficial survey that was been conducted in 2003 has failed to reveal any evidence that might hint at the existence of structures which might possibly belong to an earlier period than those here described.

Recommendations

Clearing Vegetation and Accumulation

The lime kilns should be cleared of plants and, where necessary, poison should be used to prevent the regrowth of roots which destroy the lime mortar and which also push stones out of the walling. Eradication of plants should be carried out by MWT experts under strictly controlled conditions.

The material that has accumulated around the base of the kilns could be carefully cleared away. It is to be expected that this deposit will contain some evidence that relates to the building materials, form and function of the features seen on the 1922 photographs. In that event it would be necessary to make a careful record of what is uncovered. All of the stones found in the accumulation should be put to one side for reuse in restoration.

Emptying the Interiors

Emptying the kilns would probably reveal details of the internal arrangement and would thereby cast light on the method of operation. Such clearing would need close supervision and full documentation. In so far as can be seen the basalt lining has been vitrified and is in a reasonably good state of preservation. We would suggest that the kilns are sectioned (i.e. that one quarter is removed at a time so that sections through the kiln fill can be recorded according to normal archaeological practice). In the case of Kiln II one section should be positioned so as to bisect the drawer hole.

If the inside of Kiln I were to be emptied, as would appear to be desirable, there would be two additional concerns, visitor safety and structural stability. On the other hand, careful removal of the fill would reveal details concerning the structure, including perhaps the precise position of the draw hole together with some details concerning its structure. It would then be necessary to either prevent visitors from climbing to the top of the kiln or to install a handrail. Where the draw hole has been destroyed it would be necessary to make a major structural repair.

Where the inner side of Kiln II can be seen it is observed that the lining has either fallen or been removed. It would be both expedient and visually attractive to reline the extant walling.

Mortars

With regard to restoration, it has been noted that the lime mortars which were used in the construction of each of the kilns is distinctly different. The mortar in Kiln I appears to be very red as a result of inclusions, while that in Kiln II is off white with no red inclusions. It should be possible to determine the composition of these mortars through laboratory analysis. Any program of restoration should be carried out using lime mortars that are visually in keeping with the original and which as far as possible replicate the composition.

Stones

The kilns were constructed of basalt and cut coral. There is no evidence for finely finished basalt, and no reason to expect that any was used. If the quantity of stone retrieved from clearing were insufficient for restoration there would not be any difficulty in obtaining materials from elsewhere.



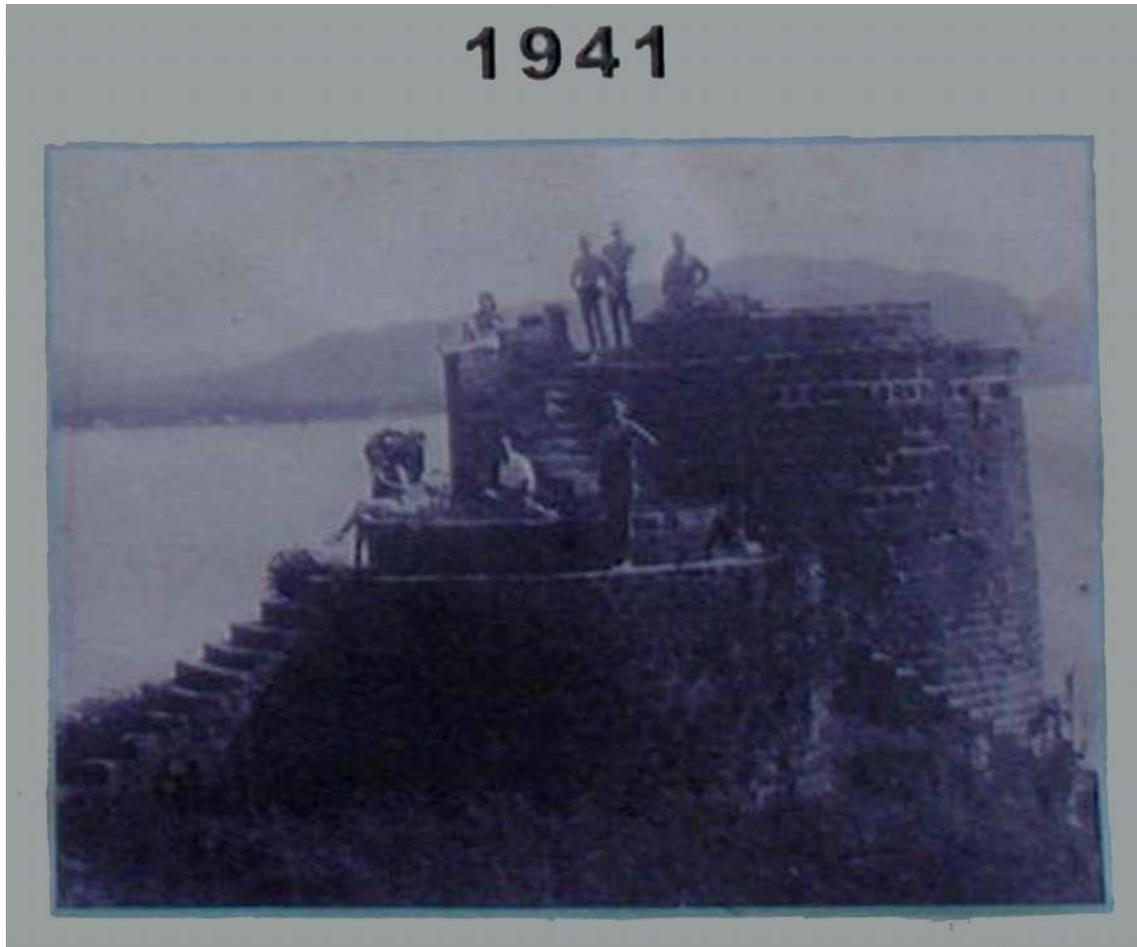
The basalt lining of Kiln II, seen in the foreground, has apparently been robbed. (ma03jv0209sm.jpg)

How Much to Restore?

Any restoration must be sufficient to prevent further deterioration of the existing structures. Beyond that there is a range of options that extend all the way up the scale to full and complete rebuilding above the extant remains. Given the level of documentation it would be perfectly possible to make full restorations, the only major difficulty being reconciliation of the old photographs of Kiln I with the extant remains that were alluded to above.



The attractive view from the top of Kiln I to Pointe D' Esny. (ma03jv0203sm)



Close up of a photograph taken in 1941 displayed on the information board at the site. (ma03jv0218)

Conclusion

As this 1941 photograph shows the Limekilns on Ile aux Aigrettes have a timeless appeal that evokes bygone ages. Their restoration would add to the store of monuments relating to the heritage of Mauritius. In particular they would reflect the human impact on nature, history of building and the development of the Mauritian sugar industry.