The Basque Country Tide Mills; a Neglected Subject

Laetitia Munduteguy

The Basque country, situated on the south-west coast of France just north of the Spanish border (see Fig. 1), is a perfect site for establishing tide mills. Outside of France the best known municipality is Biarritz on the coast. Other large towns are Bayonne at the confluence of the Rivers Adour and Nive about 5 km north-east of Biarritz, and St. Jean de Luz on the coast some 13 km south of Biarritz.

![Map of France showing the location of the Basque Country.](image)

A cartographical study followed by archaeological prospecting has allowed the presence of two medieval tide mills to be brought to light. They are St Bernard Mill, dating roughly to the fourteenth century, and Bacheforès Mill dated from the seventeenth century.

Basque Country Tide Mills in the National Bibliography

At the present time in France, it is difficult to find any book dealing with tide mills in the Basque country. Published works exist about Brittany or European tide mills, especially those in England or in Portugal (The travelling exhibition on European tide mills gives a good overview about international bibliography on the topic: see [http://www.moinhosdemarc-europa.org/](http://www.moinhosdemarc-europa.org/)). It appears that only two books mention this subject: *La Révolution Industrielle* published in 1980 and *Les Moulins à Mer et les Anciens Mouliers du Littoral: Mouleurs, Piqueurs, Porteurs et Moulageurs* written in 1989.

**La Révolution Industrielle**

This publication, written by Maurice Daumas in 1980, gives a census of the tide mills along the Atlantic coast from Brittany to the south-west of France. His study is confined to general descriptions which lists the tide mills but which does not elaborate upon the mechanisms themselves. When he deals with the south-west, only three pages are allotted in comparison to 37 entries for Brittany. There are a lot of errors although the author has consulted old maps in the Bayonne library records and read works by authors such as Eugène Goyhenetche.

**Les Moulins à Mer**

The second book, *Les Moulins à Mer et les Anciens Mouliers du Littoral: Mouleurs, Piqueurs, Porteurs et Moulageurs* co-written by Bothias and De la Verne, provides precise details about the history, environment, mechanism and the architecture of the tide mills. As with the previous publication, there are errors in regard to the south-western tide mills although they have consulted both the maps and written sources (*Plan de la Ville, Châteaux et Citadelle de Bayonne*, 1760) (Bothias & De la Verne 1989:19). They reproduced one map erroneously and omitted the last two tide mills in Bayonne: St Bernard and Bacheforès. These two published works provide some information about the Basque country tide mills but they are out-dated and need to be re-examined and corrected.

**Regional Studies**

Research on south-western tide mills is not widespread in France, but it’s important to underline the consensus of two local researchers. Firstly, Philippe Veyrin, who published, *Le Bulletin du Musée Basque* in 1936, and secondly, Antxon Aurrekaz Orondo, who drew up an inventory of the mills in 1982 for each territory: French Basque country and Spanish Basque country.

**Philippe Veyrin: Basque Country Tide Mills in 1936**

This published work is an old study yet it remains the best reference works on Basque country tide mills. His study is based upon old maps and prospecting along the coast for archaeological remains of them. Finally, his investigations discovered that tide mills once existed in Bayonne, at Saint-Jean-de-Luz, and at Ciboure and he further hypothesised about the likely existence of tide mills in Biarritz and Béhobie, where the topography lends itself to such structures.

He reproduced an excellent map (see Fig. 2) of the city of Saint-Jean-de-Luz/Ciboure: *Description Particulière de la Baye ou Havre de Saint-Jean-de-Luz* (Veyrin 1936: 416) which shows two tide mills with their
attendant ponds along with their rock fills. At first sight, the tide mill superficially looks like a simple house, but its location and the inclusion of an archway leaves no doubt about its function.

Antxon Aguirre Sorondo

In 1982, he wrote one molinological treatise about the Basque Country (both Spanish and French territories). After having compiling the bibliography on the subject, he made a census of mills (windmills, tide mills, watermills) - a real example of practical fieldwork.

On the Trail of Old Tide Mills?

In the first instance I brought together all the bibliographies regarding the Basque Country tide mills, which, as I have illustrated, was very concise. After having selected the information, I have tried to draw up a cartographical inventory from different establishments ranging from Paris (BNF: François Mitterrand Library, IGN) to the Basque Country (Bayonne Public Library, Town Hall, The Basque Museum). The records of the Bayonne Public Library were also an excellent place to find precious information about Bayonne's tide mills.

The Cartographical Census

Tide mills of Bayonne City

To make a comparison between old maps and recent ones I compiled a corpus which made it easier to analyse and track both the evolution of the landscape and to establish a chronology of the appearance and subsequent disappearance of each of the tide mills.

First of all I present the case of research in Bayonne city and, in a second example, those tide mills which exist further along the coast. The study of different maps (old maps from the 17th and the 18th centuries, Cadastral map, Cassini, IGN) reveals eight mills in Bayonne from the middle age to the seventeenth century, namely:-

Fig. 2. Description Particulière de la Baye ou Havre de Saint-Jean-de-Luz. Two tide mills are present on this map, although not easy to identify at first sight (indicated by the two circles). In the legend, the letter G indicates “Lieu destiné pour faire les escluses”, the place intended to make sluices.
South bank of l’Adour
- Le Moulin de Balichon, le Moulin de la Muhale, or le Moulin de Lurs
- Le Moulin de Tarride

West bank of la Nive
- Le Moulin de la Ville

North bank of l’Adour
- Le Moulin de Saint-Bernard
- Le Moulin du Sault
- Le Moulin de Boyer
- Le Moulin de Castera
- Le Moulin de Bacheforès

It was difficult to locate precisely each of the tide mills on the left bank of l’Adour. Whereas on the right bank it was very easy to determine all of them, especially with a plan extracted from Bayonne Public Library: *Plan de Bayonne avec les Environs, Relatif aux Projets Proposés en l’Année 1724* (Bayonne Public Library Records). One after another, it is possible to identify three mills: Sault, Boyer and Castera with their respective ponds and power canals (see Fig. 3). On the other side, Tarride tide mill (which no longer exists) was built on the “allées Marines”.

Another map, from the Map Department of the BNF: *Plan du Cours de la Rivière de l’Adour depuis Bayonne jusqu’à la Mer en 1784* gives a sweeping view of the river banks of l’Adour. This original and colourful map indicates St Bernard tide mill as: Le Moulin des Dames de St Bernard, which belonged to the convent nearby (see Fig. 4).

On the other bank it is possible to identify the older tide mill of the city: le Moulin de la Muhale, also called Balichon, Lurs or, Sabalce. According to Edouard Ducéré (Regional history researcher) it was built by Arnaud Loup de Bessabat, at the same time as the cathedral, by the Bishop of Bayonne in about 1125 (Ducéré, 1998).

Even though it is relatively easy to find representations of the previous tide mills, le Moulin de la Ville proved more difficult. To my knowledge, only one illustration has been reproduced in a published work, written by René Broca in 1996, entitled *Autour de nos Moulins* (Broca 1996: 9). The map, which is called *Plan des biens et héritages pris pour l’emplacement et construction des nouveaux ouvrages de fortifications faits à la Ville haute de Bayonne, depuis l’année 1680, entre la riviére de l’Adour et celle de la Nive, tant dehors que dedans*, is almost unreadable. Drawn during the seventeenth century, we can see the tide mill at La Place de Gramont, which fits today with the building which is the present town hall.

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**Fig. 3. Plan de Bayonne avec les environs, relatif aux projets proposés en l’année 1724.** On the right bank of l’Adour (top), the three tide mills are clearly visible, identified as: Moulin du Sault, Moulin de Boyer and Moulin de Castera.
Fig. 4. Plan du Cours de la Rivière de l’Adour depuis Bayonne jusqu’à la Mer en 1784. On this map the Sabalce mill and St Bernard tide mill are facing each other. Note that this map has the convention of north at the bottom of the map.

Fig. 5. The cadastral map from 1831, showing the location the St. Bernard tide mill.
The more recent maps such as the Cassini, Ordnance Survey Map and the Napoleonic cadastral survey indicate that most of the tide mills disappeared from the city. Place-names recall that the mills once existed, for example at: Mill Street, Canal Street, Castera Mill Street etc.

The cartographical census determined that only two tide mills still exist: St Bernard and Bachelon. The pond still exists at Bachelon Mill, whereas that at St Bernard Mill does not. However, if we look carefully, we can see the shape of the pond in the present-day landscape, as it was on the cadastral survey in 1831 (see Fig. 5).

**Tide Mills of Saint-Jean-de-Luz and Ciboure**

The two cities which were ideally situated and sheltered in a bay possess two tide mills and also there is another one along the river La Nivelle. As the author Philippe Veyrin said:

"[...] Il est bien évident qu'on ne peut bâtir de moulins à marée au bord des mers, qui, comme la Méditerranée, ne connaissent que d'insignifiantes dénivellations. Mais même sur les côtes de l'Océan, le dispositif est fort loin de pouvoir être édifié n'importe où. Les rivages hérissés de faibles falaises, même d'une faible altitude, sont inutilisables. Sur les grèves plates les vagues attaquant de front le moulin et ses digues risqueraient souvent de le mettre à mal. Reste un seul point – et c'est croyons-nous, celui qui fut toujours choisi – l'estuaire des fleuves et rivières entourées de terrains marécageux et d'alluvions."

(Veyrin 1936: 415).

**Translation**: [...] it is evident that tide mills could not be built on the sea, which, being the Mediterranean Sea, knows only an insignificant difference of tide levels. But even on the Ocean coast, the mechanism cannot be established anywhere. A shore surrounded by cliffs, even with a small altitude, is unusable. On a flat shore, the waves make a frontal attack on the mill and its weir could risk damage. It remains that there is only one point – and as we thought, it is the location which was always chosen - the estuary of rivers and streams, surrounded by boggy land and alluvium deposits.

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![Fig. 6. The Simencas Map from the seventeenth century. The top circle indicates St Jean de Luz tide mill, whereas the bottom circle highlights the one located in Ciboure city.](image-url)
The shape of the bay at Saint-Jean-de-Luz sheltered the two tide mills and protected them from the sea. Both the old and more recent maps reveal three tide mills in this area. The first one already quoted by Philippe Veyrin in his published work: Description Particulière de la Baye ou Havre de Saint-Jean-de-Luz, dating from 1625 (see Fig. 2). At the bottom, on the right it is possible to read: lieu destiné pour faire les escluses which was the place of the Mocoenia tide mill. In front of it, in Ciboure town, there is a triangular pond that corresponds to the second mill. More legibly, the Simencas map (see Fig. 6) from the seventeenth century shows the two tide mills with their ponds and weir that face each other (Lamant-Duhart 1992: 113).

Another tide mill existed along the river La Nivelle, the Billetorte tide mill. It was destroyed in 1887 for the sum of only fifty francs in order to lay out a new road, today the tide mill no longer exists, only the outbuildings which were converted into houses are visible from the road.

To summarise, three tide mills existed in Saint-Jean-de-Luz:
- Le Moulin d’Errepira / Mocoenia
- Le Moulin de Billetorte

And Ciboure:
- Le Moulin de Bordagain

The different maps revealed around eleven tide mills from Bayonne to Saint-Jean-de-Luz. I was lucky enough to be able to consult the iconographical documents, especially old engravings and watercolours from the beginning of the nineteenth century.

Tide Mills in Paintings and Engravings

Corrèges Engravings

The records of Bayonne Public Library contain one engraving by François Corrèze, made in 1887. It shows one tide mill settled on the bank of the river L’Adour. The artist would have been on the pond side, just behind the mill when he made his rough drawing. It is impossible to determine which mill it is, although it looks like the one in the Grimard painting.

André Grimard Treasures

From the 8th of July to the 30th of September, 2007, the Basque Museum received a variety of different watercolours by André Grimard. One of them illustrated Le Moulin de Tarride. However, another painting, unseen by the public still exists. I was given the opportunity to see the colour plate by Claire Noblia (Association of South Western Mills Guardianship) and also by the youngest son of the artist, François Palangié.

Two of them depict Le Moulin de Tarride, which was destroyed in 1908, at the time of the construction of the tramway between Bayonne and Biarritz. The painter chose a different viewpoint to represent each of the tide mills (see Fig. 7). From the rear we can see the mill archway and in the distance the city ramparts with the two spires of the Bayonne cathedral which pierce the sky. Below the watercolour, the artist has put the following information:

Fig. 7. Tarride Mill a watercolour painting by André Grimard. In the distance are the Cathedral spires.
“Moulin de Tarride. L’étang a été comblé au moment de la construction de la route de la barre 1857-1864. Sur la droite qui est devenue par la suite la gare du BAB.”

Translation: Tarride Mill. The pond has been filled in at the time of the building of route de la Barre from 1857 to 1864. On the right, can be seen what later became the railway of Bayonne Anglet Biarritz (BAB).

The document is dated from 1887 when the tide mill was no longer functioning, by that time the pond had been filled in. These watercolours are exceptional, full of colours which give the impression of life, but it is difficult to perceive exact information with regards to the mechanisms: such as wheel pits, rack and pinion-controlled gates etc, as it remains an artistic work.

Lili-Idiaquez y Zuluoaaga Painting

Reproduced by Philippe Veyrin in 1936 (Veyrin 1936: 417), this painting shows the bay of Saint-Jean-de-Luz from one bank to the sea. On the left we can see the tide mill with two archways.

The Last Two Tide Mills of the French Basque Country

The study determined that only two tide mills still exist. The first one, Bachelorès mill was built during the seventeenth century by Jean de Romatet, a lawyer from the city (see Fig. 9). It is on the right bank of L’Adour, downstream from Bayonne. The owner gave me an opportunity to visit his tide mill which is no longer a working mill, however the wheel pit and the millstones are preserved in the basement and the first floor. Behind the mill, the pond can still be seen. Today, the tide mill is under restoration. St Bernard Mill, which is older, dating from the fourteenth century, is situated near the convent of the same name, but downstream from Bayonne on the north bank of the river (see Fig. 10). Today called ‘angels mill’ by its owner, it has not worked since the Second World War, however, its wheel pit is preserved with two millstones along with other elements. Jean Paul Calleja made the mill available to me for one month’s study.

Fig. 8. The Plan de Bayonne et ses Environ de 1724 gives an idea where the painter was situated when he painted his watercolour.

Fig. 9. The frontage of the tide mill at Bachelorès, showing the two arches in the headrace.
Fig. 10. St. Bernard Mill, now called Le Moulin des Anges.

Fig. 11. A view of the wheelhouse at the St. Bernard mill. On the left can be seen the millstone which is above the wheelpit.

It was really instructive to compare these two tide mills. The Bacheforès one which is better preserved gave me the key to understanding the older one at St Bernard’s.

St Bernard’s Tide Mill

History

The mill building dates back to at least the twelfth or thirteenth century but it cannot be stated with certainty. I have been unable to consult all of the records, especially those in the Gascon language, which could contain valuable information. One published work written by Melanie Comex about St Bernard’s Abbey mentions the mill (Comex 2002: 114) belonging to the women of the convent – so the tide mill was already in existence in 1367. It appears that a war between the Basque and Labourdins caused damage to the tide mill which required it to be repaired.

The Mechanism

On several occasions, the owner gave me the opportunity to examine under the mill so as to try to understand the mechanism and its working. At low tide, a trap on the first floor permitted entrance to the basement although a lot of silt prevented a clear view of it. The maintenance is undertaken once a year by the city. I cleaned away the sediment where it was possible so as to take a picture and to understand the architecture. Just one of the two archways is accessible; the second one is under the mud (see Fig. 11 & 12).
The description of the mill will be made from the basement to the first floor.

**North Wall and South Wall**

The house lacks windows so only the archway permits light. Heavy and well trimmed on the ground, the north and south walls are characterized by their regular ashlar stone courses. Only the upper parts seem to have been reshaped with their use of quarry stones. I was informed by the owner that the first floor had collapsed due to the weight of the millstones during the period when the tide mill was completely neglected. When the floor had been repaired, it was difficult to retain its original height. It was necessary to observe the tide coefficient in order that the millstones on the first floor were not inundated by water. The marks on the mill frontage gave an indication of what those levels could attain.

**The South-Eastern Wall**

The wall is made up of seven ashlar layers. At the foundations, we can observe a modern concreted aperture which permits the water from l'Adour to flow to the purifying station just behind (see Fig. 13). This plughole is in contradiction with the structure, especially its upper part which has been completely reshaped. It appears that the wall has been opened so as to let the water drain away.
The North-Eastern Wall

This wall is more difficult to understand than the others and is probably more interesting. Just behind the millstones (which fell down from the first floor and never returned to their original place) the wall remains in evidence and provides the key as to what the mill could have looked like. At first, we can observe the beginning of an ashlar archway, which disappears just above the modern hole, where the wall has been totally rebuilt. In my opinion, this archway should continue through the wall and would have opened up onto the pond, as can be seen in the Bacheфорёs Mill. It was impossible to determine when and why the wall has been closed.

Just behind the beginning of the archway, there is a little recess in the wall. On the ashlar blocks, two vertical slots are clearly visible, which indicates the passage of a rack (see Fig. 14), the same system in use at Bacheфорёs. The rack and pinion gearing was run from the first floor. It permitted the miller to control the water flow from the pond to the wheel pit. On the Bacheфорёs picture, the racks are surrounded by two ashlar buttresses which thwart the thrust of the water in the pond (see Fig. 15). However one of the buttresses is missing due to an incorrect restoration of the rack by the owner. One of the ramparts appears to have given way under the force of the water.

Wheel Pits in the South-West of France

It appears that the St Bernard Mill functioned with a snail shaped wheel pit, the same system in use at Bacheфорёs Mill. The water entered via a slot onto the wheel. It is impossible to describe it because the wheel pit is completely silted up, possibly is it still present.

Bacheфорёs tide mill has three wheel pits, all of which are flooded and out of use. However, we can observe from the first floor their spiral shape; the wheel is invisible but the wooden shaft still exists.

The use of a wheel pit seems to be recurrent in the south-west of France (at Toulouse, on the R. Lot). Indeed, I

Fig. 14. One of the vertical slots, which indicates the position of one of the sluice racks. This is similar to the system used at Bacheфорёs mill.

Fig. 15. A reconstruction of Bacheфорёs wheel house. The right hand buttress is missing today and the two wheel pits are completely flooded.
have visited another mill, in Larressore, a small village near Bayonne which is different from the two other tide mills. This mill, called Osptalia Milland, is a water mill which was driven by a river. The owner has restored it whilst preserving the wheel pits. On the outside, a rack and pinion controlled gate can be observed which permitted the control of the water flow.

The Upper Floor

There is almost nothing which has survived from the medieval period. Only the length of the room and the existence of the wooden beams remain from the period of milling activity. The upper floor was the place where the miller stored the grain sacks and where he slept. Separation between house and work came later.

We can imagine what would have this place been before: the millstone under their drum casing, with their corresponding wheel pits. On the millstone, the inverted cone-shaped hopper would have been regularly filled by the miller when he was alerted by the bell ringing. The floor, which has subsequently disappeared, would have been like that at Bachefores: a heavy oaken platform.

The Millstone

It is possible to have a look at the pair of millstones if one is prepared to crawl inside: there is a bedstone and a domed millstone.
The shelving is rectilinear and its diameter is 1.21 m. On the domed millstone, we can observe two notches which probably relate to a lifting system facilitated by hinged strut (see Fig. 16), such as described in Orsatelli’s book (Orsatelli 1979: 141). It’s impossible to garner further information in regard to the millstone’s eye. The two millstones have been subsequently concreted in place.

According to the owner, another pair of millstone exists under the second archway, which is completely under the silt. These belonged to a more recent period, and are characterized by their “camembert” shape, with several segments of stone held together by an iron hoops.

The Millstone Lifting System

To obtain a high quality of meal, it is necessary to maintain the millstone by cleaning and dressing them. For this to take place the miller had to raise them up which required a heavy-weight lifting system. In St Bernard’s and Bacheфорès mills, there are no more remains of this system, so we can only hypothesise. Indeed, only St Bernard’s length of room and beams retain the traces of this system. We can observe four semicircular shape “stirrups” on the beams, which were part of the lifting system (see Fig. 17). By making comparison with several other mills, we will be in a position to determine what kind of system had been in use.

The discovery of these four “stirrups” raises a question: One pair of millstone functioned with one wheel pit, so did another one exist under the second archway. The future cleaning by the owner will give us an answer to this question.

The Miller’s Kitchen

As we saw before, the house and the work place were not separated. The house nearby was used as a byre:

“[...] A moins que le moulin ne serve aussi d’habitation. C’était le cas jadis pour quelques uns d’entre eux où s’observent encore des traces de cheminées, preuve qu’à cette époque le meunier, toujours placé sous la férule seigneuriale, n’avait pas dissocié son milieu familial de son espace de travail.” (Boithias 1989: 143)

Translation: [...] unless the mill serves as habitation. Once, it was the case for several of them, in which remain the traces of fireplaces, evidence at that time the miller was still ruled by his lord and had not separated his family life from that of his workspace.

On the north-western corner of the upper floor, the stone sink still exists (see Fig. 18). One inclined stone on the façade allowed waste water to flow out to the mill race.
Nearby, the owner pointed out the old location of the fireplace although it was lacking one bracket. Two windows light the floor. In fact, the façade restoration in 1995 revealed the existence of two doors. The boats had to moor just in front of the archway and the miller could load and unload the corn by a pulley system.

The mill had had a second floor, where the corn was stored; the owner indicates that today the elevation of the present mill no longer corresponds to the original one.

Conclusion

The study of the last two tide mills from the Basque country proved to be very instructive. Analysing different sources such as cartographical, archaeological or technical studies brings a new insight to this forgotten subject.

Comparing old maps to the recent ones in different locations (Paris and Bayonne) was necessary to quantify and determine the evolution of tide mills along the coast. Although researching some of the mills was problematic, the survey proved that it was worth studying them thoroughly as well as just utilising the Gascon records.

This investigation was followed by fieldwork, which revealed the necessity of visiting and recording first-hand the mills’ mechanisms and their architecture. The comparisons made between the two tide mills brought forth light upon such subjects as their wheel pits and rack and pinion-controlled gate usage. This survey also revealed the limits of the investigation as it was impossible to define exactly the lifting systems, or to make direct comparisons with other wheel pit mills in the area. Perhaps the planned maintenance on the St Bernard mill will confirm or deny the presence a second wheel pit.

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