

# Research programme



## Living Lab Holwerd aan Zee, testing ground for the development of the Wadden Sea coastal area. *(Version September 2019)*

### Preliminary remarks

Research themes within this research programme can often be linked to each other. This is even desirable because crossovers of several themes provide innovation and new insights. In consultation with the Holwerd aan Zee working group, multidisciplinary research questions can be formulated on the basis of the research themes that are interesting to be carried out by integrated project teams from different study programmes, faculties and study programme levels. It is also possible to link new themes, so that more programmes and at different levels can be linked to this research programme.

Research questions can be carried out on behalf of the Living Lab, the Holwerd aan Zee foundation or one of the more than 30 partners and stakeholders (read shareholders). The Living Lab fulfils an intermediary role in this. In the course of the project, research questions will change and become increasingly concrete in nature.

This Research Programme links up with various levels of education aimed at the development and implementation of Design Based Education and Design Based Research and 'Ateliers' supporting practice-based education.

Please note! Get new insights by not being distracted too much by legislation, coalition agreements and funding (as is well known). It's all about coming up with innovative ideas where possible. Think spacious, self-willed, out of the box, contemporary and, if necessary, cross. Only then will Holwerd aan Zee remain innovative.



For more information about the Living Lab:

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## Research results so far

The research results so far are, as far as possible, shown per research theme via a link at the bottom of the research questions. However, not all research reports are in the possession of the Living Lab Holwerd aan Zee. In some cases, students have made A-0 posters as end products or PowerPoint presentations. Not all of these are in the possession of the Living Lab. It is also possible that the university or university of applied sciences in question has decided that the final product may not be shown in full on the site.

Research results are made by students and are not official publications of Holwerd aan Zee. By publishing reports on this site, Holwerd aan Zee does not occupy a formal position.

### **The Living Lab Holwerd aan Zee greatly appreciates the attention given to the following matters.**

- Summary of the research in English
- formulating a follow-up research question
- a press release of max. 15 lines with regard to the results of the investigation (in consultation)
- communication via social media about the research @HolwerdaanZee
- reports are free for publication for Living Lab HaZ and other Holwerd aan Zee purposes.
- indicate, if possible, how the research fits in with the National Science Agenda, the Knowledge and Innovation Agenda 2018-2021 of the Top Sectors and the EU's spearheads.



# Research themes, sub themes and (sub)questions

## Theme I: follow-up phase of Holwerd aan Zee

Exploration of recreational ecological connection between Dokkum and Holwerd aan Zee

Research into:

- - the connection to the hinterland? Is this via the existing Holwerter Feart with 6 bridges or via a new connection to be excavated? What are the alternatives?
- - How can agriculture benefit fully from this route? How will nature benefit to the fullest?
- - And what are the opportunities for residents for a route along the villages? Bicycle and footpaths, harbours and jetties, canoe connections, etc.
- - design and maintenance of nature-friendly banks and water storage along the Holwerter Feart or alternative route.
- - Is a route via the Oude Paesens and the Foudgumer Feart possible along the terpsorpen Foudgum, Brantgum, Waaxens? What are the bottlenecks with regard to roads and bridges?
- - Is a route possible via the 'East' (Ternaard) or the 'West' (Blije)?
- - your own research question (in consultation)

[Click here to view the research results of this research theme so far. \(under construction\)](#)

## The pier as the Green Carpet of the Wadden Sea

Research into:

- Transition pier: from highway to green carpet of the Wadden Sea. A general upgrade of the ferry dam (pier) at Holwerd and that of Ameland: design, functions, target groups, etc.
- additional functions to turn the pier into a residential area and to transform it into a Green Carpet of the Wadden Sea
- what are the chances of clay being released from HaZ to make the pier green?



- the way in which the dynamics of the Wadden Sea can be brought back to Holwerd's pier. What can we learn from the pier to Mont Saint-Michel France?
- Recreation at the pier of Holwerd. Moorings, how, what, where? and How to make the link with the salt marsh on the east side of the pier?
- Design a tidal bath and connect other facilities. Canoe jetty, bird watching hut for example.
- the way in which infrastructure and guide dams along the pier can be used for nature development (nesting islands, mussel beds, seagrass fields, HVPs, and other nurseries of the Wadden Sea)
- Do guide dams provide space for the (reintroduction of the) flat oyster?
- transformation of the pier in Ameland into a residential area, in combination with the greening and transformation of the pier in Holwerd aan Zee.
- your own research question (in consultation)

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## Master plan

New functions and the deep access channel also create a challenge at the beginning of the pier. In this area:



A place from which excursions to the salt marshes are organised. In the future, large groups of mudflat walkers will cross the new bridge here to pass the trench. This is also a place where it is not allowed to park now, but where many people are already present. How do we solve this?

This is also a location to show different things. What will this area look like in the future? Will we have a visitor centre in the pier? The purpose and functions will determine the programme of requirements, for example:

- Info about Holwerd aan Zee
- Technique of the battens, the sluice
- Info about Sense of Place along the coast and A Dyke of a Woman and waiting for High Water
- information about the dynamics of the salt marshes of It Fryske Gea and the Forestry Commission (Staatsbosbeheer)
- fish migration



- information about the future clay factory and the wide green dike (dyke reinforcement)

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## Theme II: Sustainable Tourism: 'small-scale tourism on a large scale along the coast'.

### Sustainable tourism, World Heritage experience, strengthening cultural history and landscape development

Research into:

- what 'slow tourism' and 'sustainable tourism' can look like along the coast. What are points of attention, pitfalls and good examples elsewhere in the world?
- describe the target group for Holwerd aan Zee and the rest of the coastal area
- location and design of tiny houses
- location, conditions and design of Urban Camping (after the example of Urban Camping Amsterdam)
- the target group of Wadden sailors (and their sailing class) that Holwerd aan Zee would like to visit
- Wadden Sea packages, culinary tours, educational tours, picking tours, mudflat walks and accompanying marketing concepts
- examples of similar culinary tours of discovery in other areas in the Netherlands and abroad
- construction and design of the beach: outside the dike / inside the dike. How does the beach remain silt-free? Floating?
- Exploiting Dark Sky, and the relationship with De Nieuwe Afsluitdijk, the Dark Sky Park Lauwersmeer and Ameland. Experiences from the Dark Sky area of Terschelling can also be learned.
- What is currently being caught by anglers on the coast near Holwerd and Ternaard, for example? Please pay attention to trends. Which species and who is fishing for them from the shore. And how can this development be better facilitated? For example, from the pier of It Skoar near Ternaard.
- your own research question (in consultation)

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## Culture and (Landscape) art

Research into:

- the way in which Holwerd can be marketed as the centre of Sense of Place
- the interaction between nature, landscape, cultural history and landscape art
- target groups, wishes, motives and interests
- the link with (the legacy of) Leeuwarden Cultural Capital 2018, (landscape) art Sense of Place, Oerol, Ameland Art Month, the old Shrimp Factory in Moddergat
- Cultural events that can put Holwerd aan Zee on the map (in the coming years)
- your own research question (in consultation)

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## Recreation mounds

Research into:

- building up mounds over the years. What can we learn from this for the new mounds?
- history of the mounds and their inhabitants (and which elements are reflected in the new mounds)
- recreational mounds energy-neutral: mounds used to be self-sufficient. How can we achieve this again?
- target groups: what type of tourist would like to experience ebb and flow in a holiday home on a mound in the Wadden Sea World Heritage Site?
- your own research question (in consultation)

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Holwerd - Ameland connection, fairway, ferry dam, transport concepts, cooperation between entrepreneurs and nature managers.

Research into:



- more dynamics for nature and more value for the tourist in the salt marsh on the west side of the pier.
- Mooring facilities outside the dykes (east side) adjacent to the pier or adjacent to the salt marsh of the Forestry Commission (Staatsbosbeheer) to the east of the pier.
- the connection between the nature of the salt marshes, the dry and wet mudflats and the nature of Ameland. Can this be used commercially and what is the role of entrepreneurs / nature managers?
- innovative transport concepts: research into the possibilities of new forms of transport to Ameland and back. But then: clean, sustainable, quiet (not only above water but also certainly under water), fast if necessary, self-directed if possible. And always safe. In other words, innovative hull shapes, hull materials, wings, electric propulsion on green electricity, batteries that recharge themselves by means of electricity generated by the currents on the mudflats and moored in the harbor.
- coordination of island and coastal tourism products (entrepreneurs)
- investment opportunities for island entrepreneurs on the mainland / housing personnel
- the nature of the salt marshes near Holwerd up to the dunes of Ameland as a connecting element. What do the nature managers Staatsbosbeheer and It Fryske Gea do together and where are the opportunities?
- strengthening day tourism and arrangements between Holwerd - Ameland
- your own research question (in consultation)

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Connecting the tourism sector Holwerd aan Zee, Dokkum, Kollum, Lauwersmeer area, Zoutkamp, Lauwersoog, Schiermonnikoog, Noordpolderzijl

Research into:



- the quickest way to connect entrepreneurs and raise the level of tourism products
- which tourist packages are missed
- What is the best way to link up with regional and national PR campaigns for the Wadden Region?
- What is the similarity between the Wadden Sea coast and the Lauwersmeer region, what are the linking opportunities?
- How can the connection between Holwerd aan Zee and other magnets along the coast be made? The Nieuwe Afsluitdijk, the Vismigration River, De Heining pumping station, the World Heritage Centre, etc.
- your own research question (in consultation)

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## Virtual reality, augmented reality-games, experience innovations and real time information services

Geolocation games / adventure AR games is the most exciting genre in the world of 'augmented reality games'. AR is a live, direct or indirect, image of reality to which elements are added by a computer. These elements, sometimes added with the help of QR code, often contain sensor data or extra information about the environment. With the help of the GPS on the smartphone, the 'player' discovers the area and carries out assignments. A great opportunity for the new (young) visitor.

Through Geo Tagging games (in the villages, dikes and nature) the story of the Wadden can be told and experienced. With assignments, clues to collect the tags. Think about it:

- Geodashing
- Geohashing
- Geocaching
- Pokemon GO / Ingress
- Resources and other simulation games
- Color Planet
- Zombies, Run! / Turf Wars

Research into the possibilities of these AR games. What are the chances?

- your own research question (in consultation)

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## Holwerd Culinary, Culinary Wadden, Wadden Gold and other regional products on the menu





Research into:

- opportunities for sustainable fishing at Culinary Holwerd and Culinary Wadden Tours
- What does it take to create a saline picking garden in combination with a walking route? Attention should be paid to options inside the dike at a place where the soil is low (also in the vicinity of Ternaard) with salinization close to the surface. And attention should be paid to a location in the salt marshes. Is this possible with a smart design of the salt marsh (with water levels, excavation, flagellation, planting, etc.)? What is possible in this area? What can we learn from best practices?
- historical 'forgotten crops' in addition to the culinary offerings of Holwerd Culinaire
- connection between saline crops and regional products and the offer of Holwerd Culinaire
- menu choice and composition of salty vegetables, Waddengoud and other regional products for a Culinary Holwerd / pop-up restaurant
- integration of Holwerd Culinaire and Ameland Culinaire, who what where? Pairing opportunities?
- Connection of 'the new Dutch kitchen' to Holwerd Culinaire
- new salty regional products (e.g. Lamb cheese, marsh samphire mustard, sea salad sauce, Wadden beer, Wadden sausage from salty livestock farming ;-)) and matching marketing concepts
- (culinary) events that can put Holwerd aan Zee on the map (in the coming years)
- your own research question (in consultation)

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## Wellness

Research into:

- the ingredients of mudflats that can be used for wellness. What makes the Wadden Sea coast and Wadden Sea floor so unique that it has a beneficial effect?



- location wellness hotel / spa within Holwerd aan Zee
- Distinctive power compared to the many German wellness centres
- Reference images of wellness centres and spas suitable for Holwerd aan Zee
- marketing concept wellness / health resort Holwerd aan Zee
- the role of thermal geothermal energy in the wellness concept
- The possibilities of using Apps and innovative mobile equipment in combination with excursions to the salt marshes and (culinary) mudflat hikes.
- your own research question (in consultation)

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## Care (tourism) and recreation

The market for preventive wellness is growing; conscious handling of stress and ensuring optimal condition and health will become increasingly central themes in our society under the pressure of the ever-increasing costs of healthcare.

(Source: Trend Report Tourism, Recreation and Leisure 2012)

Research into:

- trend and developments in the field of medical tourism and health tourism
- the way in which the Wadden Region in general and Holwerd aan Zee in particular can respond to the shortage of locations and activities suitable for the combination with care
- the framework conditions for the provision of services and guidance
- the extent to which the Holwerd Health Centre is suitable for cooperation with entrepreneurs to meet the demand for care-related holidays
- the way in which the healthy green environment of Holwerd aan Zee and the clean air, in relation to outdoor activities and excursions, can contribute to health tourism on the Wadden Sea coast
- What are the commercial opportunities for Yoga, mind walks, anti-stress programs in the salt marshes near Holwerd aan Zee and the rest of the Frisian Wadden coast.
- quick scan into the way in which entrepreneurs on the coast pay attention to this target group
- your own research question (in consultation)

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## Circular economy and Sustainable energy production and more

Research into:

- HaZ tidal lake as potential sludge collection: what can we do with it and how does this process proceed?
- HaZ passage in the dike as a potential substitute for micro-plastics: how and what do we do with the 'won' micro-plastics?
- forms of sustainable energy production in a tidal area (underwater kites, hydropower, blue energy)
- smart design of Holwerd aan Zee in relation to sustainable energy production
- use of thermal energy (relatively close to the earth's surface in the coastal zone)
- innovative forms of transport between Holwerd aan Zee and Ameland
- your own research question (in consultation)

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## Theme III: Nature and biodiversity, coastal and marine management, waterway Holwerd - Ameland

Nature development, biodiversity, fresh-salt, utilisation and management of nature

Research into:



- possibilities by adjusting the freshwater management and drainage of the seaward side of the sea dike in such a way that the reed zone in the salt marsh halfway between the pier and It Skoar expands? How should the profile of the sea dike and ditches be adjusted parallel to the dike? What is the added value of these outer dike brackish (reed) zones? An example is the reed bed to the east against the pier (which in the plan has to make way for the access channel).
- optimising biodiversity and Natura 2000 target species and habitats: nesting islands within the dykes, foraging sites and HVPs (which target species, improvement targets, which subsoil, clay or sand, vegetation, height, depth, which tasks N2000, trilateral agreements, etc.).
- management of the new nature by an area cooperative in cooperation with farmers and nature organisations in connection with the involvement of the local population, bird watchers, bird counters, etc. (read: future ambassadors)
- Which areas - according to the altitude map - between Holwerd and Ternaard, could serve as water storage, for example by means of nature-friendly banks of the canals and other ways of water storage. The results can be combined with recommendations on flowery field margins and the species of birds and insects that will benefit from them.
- Your own research question (in consultation)

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## Fish migration, transitional area, strengthen living and spawning area for fish, outside the dykes, inside the dykes

Research into:

- Development of a transition area / brackish zone between the polder and the Frisian Boezem, swimway (boundary conditions and design)
- what we can learn from the fish migration river (Vis Migratie Rivier) on De Nieuwe Afsluitdijk and the Vijfhuizen pumping station (De Heining)
- more logical places for fish migration. How to fill the missing link in terms of the fish migration gap between Holwerd and Lauwersoog.
- The question of what this means for the inland fishermen in Fryslân is: what is the potential of glass eels to enter the area?
- the effect of the design of the salt marsh and the grazing management in relation to the fish species in the area
- your own research question (in consultation)

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# Theme IV: Agriculture and water, Climate change and water safety

Agrifood and salinisation, salt-adaptive agriculture and saline cultivation

Research into..:

- opportunities for salt-adaptive seed potatoes as an export product, conditions, opportunities and threats
- design HaZ for saline cultivation: crop selection and zoning of salt-resistant potatoes and vegetables, salt-loving vegetables in combination with cockles, flat oysters, sea eggs, ragworm, farmed fish, seaweed, etc. ). Which conditions are important for these forms of aquaculture? What is the best return for the farmer and (inland) salt marsh nature?
- Coupling of saline cultivation with meadow bird management and nature development (design and management conditions)
- opportunities from Holwerd aan Zee for seaweed harvesting and other forms of 'sea farming' from Holwerd (food for people and animals, for energy or as a raw material)
- smart circular flows within saline agricultural businesses
- How can the purification of seawater and the extraction of silt ultimately lead to the ultimate conditions for aquaculture and the cultivation of saline crops for biomass, both inside and outside the dikes?
- positioning HaZ in relation to the objective of the Top Sector Water and Top Sector Agri&Food
- your own research question (in consultation)

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Peasants Measuring water, salinisation monitoring network Holwerd aan Zee and surrounding areas

Research into:



- the contribution of an area-wide monitoring network around Holwerd and other areas. What can you contribute to the pilot 'Measurement of Farming Water' in collaboration with Wetterkip Fryslân, LTO Noord, AcaciaWater and Holwerd aan Zee?
- the buffer zone between the salt flushing lake and the surrounding agricultural land. How do you prevent salt from mixing with fresh groundwater and hampering agricultural use? So how do you design this area? Steel sheet piling or a water system of ring channels to catch the salty / brackish water.
- the influence of the structure of the soil (soil layers, etc.) on salinisation
- your own research question (in consultation)

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Flood risk management, silt as an opportunity, broad & rich (green) dikes, multifunctional dike, KRW tasks, salt marsh management and building with nature.

Research into..:

- opportunities for sediment capture for agricultural structure improvement, use of dredged sediment for agricultural and other purposes. Effects on the quality of agricultural land (old sea clay and sandy soils from, for example, Ameland).
- What can we learn from trials in Groningen of reuse of sediment? Eems-Dollard 2050
- what it takes to raise the seawall annually with small layers of silt (growing with the sea). What can we learn from our German Eastern neighbours? Why can this principle be applied there and what is needed for a test at Holwerd aan Zee (spatial, technical and legal)?
- functions and facilities suitable for the green (multifunctional) dike, constructions, possibilities and impossibilities of the hotel and other multifunctional use of the sea dike.
- Which flowering plant species can be used on the dike as an alternative to grass. What are the advantages in terms of water safety? Which insects and birds benefit from this and what do sheep farmers think of it?
- re-use of the clay and sand released to strengthen the dikes: conditions, characteristics, field research, soil research, etc.
- Your own research question (in consultation)

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## Soften edges of the mudflats, foreshores, salt marshes, CO2

Research into:

- Connection to the salt marshes in combination with innovative dike concepts such as the 'rich dike' and the broad 'green dike'.
- wide green dike' design with connection to foreshore and salt marshes
- Expanding salt marshes for water safety and nature to the east of the eastern salt marshes
- How much CO2 can a new salt marsh capture and what is the annual yield of certificates? Per tonne of CO2, per hectare?
- your own research question (in consultation)

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## The surface water system and 'boezem' around Holwerd aan Zee

Research into:

- savings in m<sup>3</sup> and euros for Wetterskip Fryslân through the natural release of excess fresh water via polder lake Holwerd aan Zee (instead of a pumping station at that location) + estimated savings on banks and quays, for example in Dokkum due to a shorter discharge route.
- Opportunities, particularly in dry periods, for flushing brackish water with water from the area and the Lauwersmeer back towards the tidal lake of HaZ instead of fresh water from the IJsselmeer. What is needed for this? How much fresh water could this save during dry periods?
- Opportunities and/or design of the grinding basin and discharge of the new Wetterskip Fryslân pumping station via Holwerd aan Zee (grinding capacity approx. 35m<sup>3</sup> /sec).
- Pumping back salt / brackish water from the surrounding agricultural area to a buffer lake in an energy-neutral manner (using modern 'historical' wind engines, for example).
- a passable sluice between salt and freshwater inland dike or other solutions against freshwater - salt mixing with the storage basin / waterway to Dokkum (Phase III)
- The role of the old dikes around Holwerd in relation to the buffer lake and inner dike reinforcement.
- your own research question (in consultation)



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## Theme V: Environmental management, area cooperation and governance

### Population decline and quality of life and the role of an area cooperation

Research into:

- Adjusting the spatial planning of the centre of Holwerd aan Zee
- Possibilities and opportunities for entrance south side of Holwerd and opportunities for a southwest bypass
- the role of an area cooperative in the field of Recreation & Tourism
- form of organisation of such an area cooperative
- good examples elsewhere
- monitoring the effect on population decline / comparison with Northern Germany
- the effect on facilities because of Holwerd aan Zee
- the impact of HaZ on the image of the shrinking region of North-East Friesland (local and national)
- connection of HaZ to national, regional and provincial 'shrinkage programmes
- your own research question (in consultation)

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### PR & Marketing, Storytelling, National Parks new style, Most beautiful nature reserve of NL

Research into..:

- the story of Holwerd aan Zee and the genesis of the Netherlands. Storytelling. The role of the salt marshes. "The making of the Netherlands." The story of mounds (terpen), churches, docks and dikes.





- folktales from the area and a way in which the stories can become part of the 'branding' of Holwerd aan Zee.
- The added value of storytelling as a leitmotiv through the design of B&B's, holiday homes and hotel rooms for a unique authentic experience to remember (: frame of reference, style elements, story). How to organise and best practices elsewhere.
- The way in which a new destination such as HaZ and/or the Wadden coast can be put on the market, in connection with the Wadden World Heritage Site and the Lauwersmeer region, Dokkum Admiralty City, Lauwersoog, Zoutkamp, Ameland and Schiermonnikoog.
- The elements that make Holwerd aan Zee unique in the Wadden World Heritage Site of the Netherlands, Germany and Denmark.
- development of Holwerd aan Zee as a pearl of northeastern Wadden Sea as a destination. What is needed for this?
- good examples and reference images inside and outside the World Heritage Area
- the possibilities of crowdfunding and associated media attention
- content and marketing message Holwerd aan Zee whether or not in relation to Ameland and Dokkum
- the role of (international) internet forums of departments, scientists, (international) knowledge institutions, nature parties, political forums, etc. (message and link to social media)
- metamorphosis from the project office Holwerd aan Zee into a living lab / information café / visitor centre
- design website Hotel Holwerd (content and experience)
- the way in which HaZ can connect to the most beautiful nature reserve of NL / Holland National Parks / NBTC 'metro lines'.
- the way in which HaZ can respond to the demand from foreign culture tourists from overseas (America, China)
- Dark Sky, and the relationship with De Nieuwe Afsluitdijk, Lauwersoog, the Lauwersmeer area and Ameland.
- the way in which 'knowledge tourism' and the living lab can become part of the HaZ branding
- your own research question (in consultation)

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## Public administration, Government management, political science

Research into:

- The relationship between the New Environmental Act and Holwerd aan Zee: is the new Environmental Act prepared for integrated bottom-up area developments (grassroots projects) such as Holwerd aan Zee?
- government participation: how do governments deal with a citizens' initiative of more than 60 million? What should governments do and what should they not do when it comes to such a citizens' initiative? What changes are necessary to shape the civil society?
- steering governments towards 'slow tourism' and 'sustainable tourism' along the coast. What are the (Spatial Planning) instruments?
- lessons learned: Holwerd aan Zee can be done anywhere! Is that true? What are the do's and don'ts, success and failure factors of the Holwerd aan Zee process?
- support among the inhabitants of Holwerd and the surrounding area, politicians, the business community, etc. Is the support still 100%?
- the way in which politics responds to the civil society
- opportunities and threats in the field of spatial planning for Holwerd aan Zee
- opportunities for recreational destinations on the current housing stock and solutions for the shortage of (recreational) homes that is now emerging
- your own research question (in consultation)

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## UNESCO Man and Biosphere Programme (MAB)

UNESCO Man and Biosphere Programme (MAB): Holwerd aan Zee is regarded by UNESCO Nederland as an innovative initiative that focuses on sustainability and sustainable tourism in the Wadden region - in a broad sense - in which the relationship between man and nature is central. UNESCO therefore sees an opportunity to designate Holwerd aan Zee as a Man and Biosphere Programme project. The enthusiasm for this has grown all the more due to the current cooperation with MBO, HBO and WO and the fact that HaZ has grown into a real 'living lab' for the development of the entire Wadden area. The focus on education, research, sustainable tourism and a broad cooperation / networks is exactly what UNESCO has in mind with MAB areas. The designation MAB on Holwerd aan Zee is of added value in the UNESCO World Heritage Area and for increasing the international (knowledge) networks and European subsidies.

Research into:



- what we can learn from the approximately 669 other MAB areas in approximately 120 countries, best practices, etc.
- How HaZ can use the MAB status in combination with the World Heritage status of the Wadden Sea.
- the feasibility of the Holwerd area (including pier) - Ternaard - Blija - Dokkum as a MAB area
- what it takes to obtain/apply for this status
- your own research question (in consultation)

Click here to view the research results of this research theme so far. (under construction)

