1 After the deluge: an introduction

1.1. Project outlines

The project "*Farmers of the Coast*" revolves around the thesis that Bronze Age coastal communities were thriving farming communities with their own cultural identity and with a central position in communication networks (Fokkens 2011, 1). The region of West-Frisia is well suited for studying prehistoric communities on the North Sea coast. Not only was its location central in a transport geographical sense, but it is also one of the best investigated and preserved Bronze Age landscapes in north-western Europe. Since the 1960s, dozens of hectares have been excavated in this region and hundreds have been surveyed by field surveys and with remote sensing techniques (aerial photography). Due to the clayey subsoil the conditions for conservation of organic material are excellent. At the start of the project in 2011 only a few preliminary publications were available. Only the excavations of *Hoogwoud*, *Zwaagdijk*, *Medemblik* and *Enkhuizen-Kadijken* (Lohof & Vaars 2005; De Wit and Stokkel 2011; Schurmans 2011; Roessingh & Lohof 2011) had been published at that time. The majority of the research, surprisingly, had not been published. Interestingly the bone assemblages and most of the botanical analyses were published (IJzereef 1982; Runia 1987; Buurman 1996). Furthermore the pottery of *Hoogkarspel* was studied by Brandt (1988) and the bone material of this site was published by Clason (1967).

The project "*Farmers of the Coast*" focuses on these extensively excavated, but poorly published archaeological sites as case-study of coastal farming communities. The project is divided into four subprojects that study the people of the coastal wetlands from different perspectives. The first project deals with the physical environment and possibilities for habitation in the period between 2000 and 800 cal BC and is the subject of this PhD-thesis. It provides the environmental framework for the analysis of the settlements, farming practices and the place of coastal communities in communication networks. The settlements are the subject of a PhD-thesis by Wouter Roessingh (Roessingh in prep.). The farming practices are studied by Yvonne van Amerongen (Van Amerongen 2016). The communication networks are part of the research project by Patrick Valentijn (Valentijn in prep.).

In order to provide such an environmental framework for these studies to the settlements, farming practices and the place of coastal communities in communication networks several research questions have been formulated. The following three research questions are central in this study of the physical environment of the West-Frisian coastal wetlands (Fokkens 2011, 8):

1. How was the physical landscape of West-Frisia structured and how did it develop between 2000 and 800 cal BC?
2. Which parts were favoured for settlement?
3. What restraints and opportunities did it offer people?

1.2. Structure and development of the physical landscape between 2000 and 800 cal BC

The current model for the genesis of the West-Frisian landscape was developed in the fifties and sixties based on the work of Stiboka, the Netherlands Soil Survey Institute (Pons and Wiggers 1959; 1960). The soil scientist Ente of Stiboka was the first to map systematically a large area (over 61.000 hectares) for archaeological purposes (Ente 1963). He achieved this during the soil survey prior to the land consolidation project of *De Streek*. This work of Stiboka and Ente (1963) has been of great influence on the ideas of landscape and habitation dynamics in the Bronze Age of West-Frisia. Based on the large scale excavations of the sites *Andijk*, *Hoogkarspel, Bovenkarspel-Het Valkje* and the subsurface model of Ente and his co-workers a simple and elegant model was developed for the habitation in the Bronze Age (Van Geel *et al.* 1982; figure 2.9). In 1997 Van Geel *et al.* (1997) published in a convincing article a climatological cause for the abandonment of West-Frisia at the end of the Bronze Age, which seemed to fit the data at that time. It is this model that raised many questions during the processing of the data of the site *Enkhuizen-Kadijken* as described in the preface. This settlement site is situated on top of tidal marsh deposits instead of a creek ridge as is expected according to the model. Many indications for woodlands are present at this site whilst the model suggests the presence of an open almost treeless landscape. Indications for peat growth are absent at this site in contradiction to the model, which expects a peat cover up to several meters. Are these contraditions just minor details which can be explained with a few modifications of the existing model or are they caused by a more fundamental problem? In chapter 2 the history of landscape research in West-Frisia will be dealt with extensively, in order to grasp the model in full detail.

In 2011 a new national palaeogeographical reconstruction was published (figure 2.10; Vos *et al.* 2011). The coastal development model of the eighties plays an important role in the configuration of this map (Vos *et al.* 2011, 32). Furthermore, the available data from archaeological research has not been used to its full potential. This is well illustrated by the number of settlement sites situated on top of peat deposits in figure 2.10. Not a single Bronze Age settlement site situated on top of peat deposits has been excavated in West-Frisia yet. In order to understand the position of West-Frisia in a transport geographical sense and develop ideas on communication routes and networks, the palaeogeographical map should at least fit the available archaeological data. Therefore a new palaeogeographical map is needed, which is one of the goals in this project.

For the development of such a map at this scale, three ingredients are needed: subsurface information, a coastal development model and a time-framework. In chapter 3 these are presented, evaluated and used for the construction of a new palaeogeographical map. In chapter 3 the three inlets which have influenced the development of West-Frisia, Bergen inlet, Oer-IJ estuary and Vliestroom, are studied in relation to each other including the rivers Vecht and Vecht-Angstel debouching in the accompanying tidal basins. First the available set of dates is evaluated in detail. Second a set of 29 key sites within the Bergen tidal basin is described in more or less detail depending on the amount of information. Thirdly the study by Van der Spek (1994) of the evolution of tidal basins as presented in chapter 2 is incorporated in a new development model for West-Frisia. This new model is applied in the presentation of three small scale (1:100.000) palaeogeographical reconstructions for 2100, 1500 and 800 BC.

A palaeogeographical reconstruction at this small map scale can be used to provide answers on communication and transport routes in general, as needed for the project of Valentijn. It does not provide answers at the scale of the settlement site or the area exploited at a daily base, needed for the projects of Van Amerongen and Roessingh. At this map scale, the reconstruction of the landscape in abiotic terms is less relevant. Arnoldussen (2008, 48) expresses this very clearly with the statement that: "…*the different types of vegetation…will have been noticed by, and have mattered to, prehistoric communities*." The question is, is it possible to provide a reliable palaeogeographical reconstruction including the biotic environment?

Firstly, it is important to note what information the archaeologist needs for answering questions on the exploitation of the catchment area. Therefore an inventory of palaeogeographical reconstructions compiled for archaeological purposes is carried out. Secondly, there are various ways to establish a reconstruction of the biotic environment. In the recent past several studies concerning this topic, with quite different approaches, have been published (Van Beurden 2008; Groenewoudt *et al.* 2008;

Gaillard *et al.* 2008; Schepers 2014). In chapter 4 a method for the reconstruction of the landscape including the vegetation in phytosociological classes at a larger map scale is presented. The basis for this method is the idea that the succession of a vegetation depends largely on soil properties, hydrology and water quality. This idea has been applied previously within the research project "*Living in a dynamic (cultural) landscape*" (Fokkens 2003; Arnoldussen 2008; Van Beurden 2008). In this project the phytosociological classes were reconstructed based on pollen assemblages and reconstructed abiotic factors. An important disadvantage in this research strategy is the lack of actual indicator species because classification of pollen is rarely possible at a species level. Therefore the reconstruction of the vegetation classes in such a way largely depends on expert knowledge (Van Beurden 2008). Schepers (2014) recently presented a reconstruction of a palaeovegetation in phytosociological classes based on macrobotanical remains from a channel lag deposit. Schepers (2014, 35) argues that the macrobotanical remains in this deposit represent different vegetation types in a wider area. These can be identified in phytosociological classes using the indicator species present in the sample. In the present study this idea of Schepers (2014) has been applied to the botanic databases of several excavations in West-Frisia. In line with the thought of Schepers (2014), these macrobotanical assemblages represent the phytosociological vegetation classes of a wider area. In chapter 4 this idea, combined with the method developed in the project "*Living in a dynamic (cultural) landscape*" has been applied to the land consolidation area Westwoud resulting in two palaeogeographical reconstructions for 1500 and 800 BC (figure 4.9A and 4.9B).

1.3. Site location preferences

Within West-Frisia little less than a hundred excavations of sites dating to the Bronze Age have been carried out (Roessingh in prep.). Every site contributes to our knowledge of site location preferences of societies from the Bronze Age. Not only have a large number of excavations been conducted, large parts of West-Frisia have also been surveyed by field surveys and surveys with aerial photography (De Vries-Metz 1993). Furthermore large parts have been surveyed by hand corings (a.o. Ente 1963; Mulder *et al.* 1983; Manning and Van der Gaauw 1987). This high density of information should facilitate the relating of site locations to soil properties, vegetation or topography. One of the goals in this study is to clarify these presumed relationships in order to use this information. This knowledge can be used for management and planning in future development projects.

It is impossible to analyse all excavated sites within the scope of this project. For this study, a selection has been made of several well-documented, large scale excavations. The site location information of this selection of sites regarding soil properties, relief and so on will be evaluated in detail. The resulting information is tested during fieldwork. The evaluation and the results of the field work are used for recommondations for predictive modelling in the future.

In chapter 3 the site distribution in West-Frisia for late Neolithic and Bronze Age sites is explained in general. Figure 3.13 explains why soil maps and geomorphological maps or LIDAR-images cannot be used in the analysis of site distributions in West-Frisia, as is a common practice (De Boer and Molenaar 2006; Molenaar and Van Berkel 2013). In chapter 4 the palaeogeographical reconstruction of West-Frisia at a large map scale is verified with the actual site distribution and the available air photographs (figure 4.9A and 4.9B). An alternative relationship between landscape and site distribution can be deduced from this analysis. Based on this chapter, it could be argued that site distribution is related to vegetation, soil properties and hydrology. In chapter 5 the case *De Rikkert* is presented, a location selected to test ideas on site distribution and site visibility (Roessingh and Valentijn in prep.). Furthermore the stratigraphy of the settlement sites *Andijk*, *Hoogkarspel*, *Bovenkarspel-Het Valkje*, *Medemblik-Schepenwijk* and *Enkhuizen-Kadijken* is discussed in detail. Based on this analysis the site distribution of Bronze Age sites and Late Neolithic sites in relation to the geomorphology is evaluated. At the end of the chapter an important question has to be answered: to what extent is our idea on site distribution biased by research history?

This question is one of the main topics of chapter 6. In this chapter, the present day archaeological practice of predictive modelling in The Netherlands is presented and analyzed for the situation in West-Frisia in particular. The influence of the effectuated policy on archaeological research in the eastern part

of West-Frisia is evaluated, based on an analysis of 54 inventories carried out after the publication of the actual policy document in 2006 (De Boer and Molenaar 2006). This analysis is used for an evaluation of the effectiveness of different techniques of field research. These techniques have been tested at *De Rikkert* during four successive years. This analysis and the results of the fieldwork at *De Rikkert* result in an ideal flow chart for predictive modelling in eastern West-Frisia.

1.4. Restraints and opportunities of the environment

The new development model of West-Frisia presented in chapter 3, describes on the one hand limitations for the exploitation of the landscape in general, for example by the distribution of lakes and peatlands. The characterization of the landscape for the different periods on the other hand provides opportunities for land use in general. In chapter 4 the restraints for land use for agricultural purposes are investigated (§ 4.3.1 and 4.3.2). An analysis at site level in chapter 5 provides information on the actual use of the landscape in excavated sites. With the information assembled in chapters 3, 4 and 5, general ideas for restraints and possibilities in land use can be formulated. Based on the assembled information an answer is formulated in chapter 7 to one of the main research questions of the "*Farmers of the Coast*"-project: "To what extent did the physical and biotic landscape determine possibilities for habitation, subsistence, accessibility and contacts?"

1.5. For what use?

The palaeogeographical reconstructions at different map scales presented in chapters 3, 4 and 5 are considered to be of use for predictive modelling. The presumption for this use is that there is a relationship between the nature of the subsurface and the distribution of archaeological sites. The evaluation of techniques used in predictive modelling presented in chapter 6, will leave us disillusioned with regard to this presumption and the use of detailed soil maps. Therefore chapter 6 concludes with an idea for a new type of policy document, which meets the demands of the new legislation which will be introduced in 2018. This idea is inspired by the preservation model developed by De Beer *et al.* (2011) for the medieval city of Bryggen (Norway). Such a policy document helps with finding the unknown instead of affirming the known archaeological remains. Such a document gives the possibility of incorporating new insights far more easily compared to the present day documents, which have been developed for fixed 10 year periods. The predictions from this model are directly based on data instead of postulated relationships. This line of thought is elaborated in chapter 6. I hope this line of thought will help to create a sustainable archaeological policy document for the nearby future.