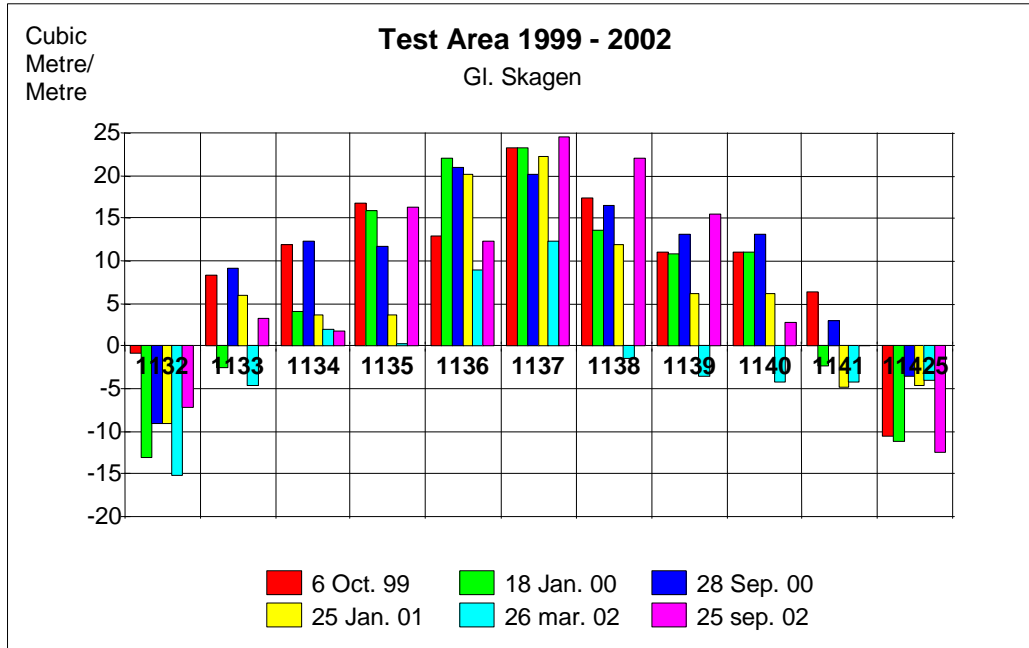# Appendix 3

The SIC System compared with beach nourishment on the West Coast of Jutland.

Coastal development at Gl. Skagen - fig. 1

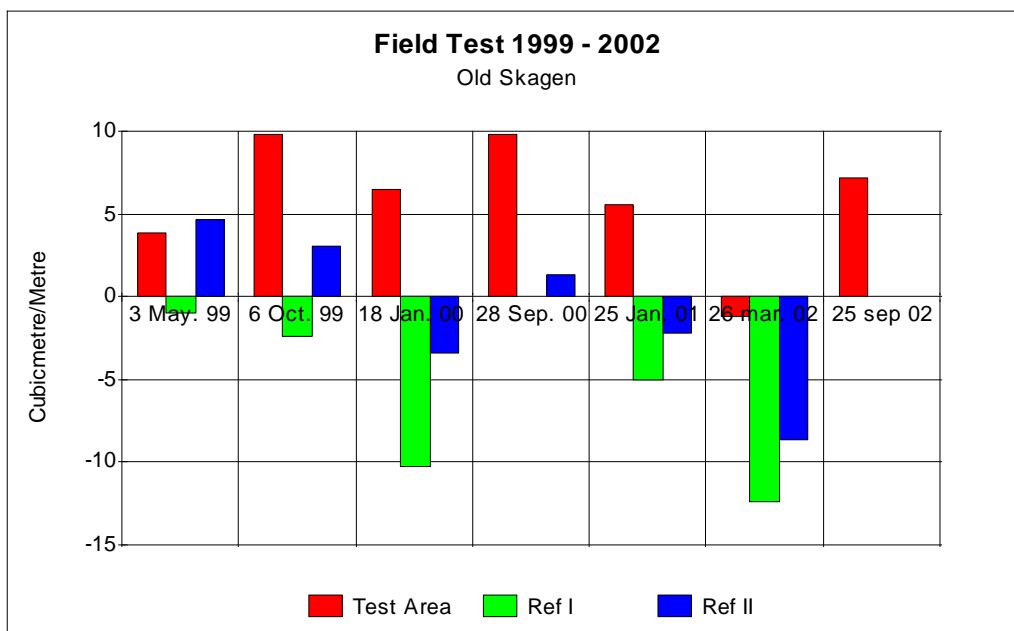As illustrated in fig. 1, the SIC System has a systematic building effect on a beach profile.

Fig. 2

The longtime effect is shown in fig. 2, where the Test Area fitted with pressure equalization modules has a coastal increase of $5 - 10$ m^3 per metre as opposed to the reference areas which show an erosion of $3.5 - 10$ m^3 per metre.

Erosion/Beach nourishment on the Danish West Coast.

Sediment Calculation West Coast of Jutland				
Distance Stenbjerg - Nymindegab			130000	Metre
Erosion				
Erosion direction north	Stenbjerg	-600000		Cubic metre
Erosion Agger Point		-330000		Cubic metre
Erosion Thyboroen Point		-900000		Cubic metre
Erosion south	Nymindegab	-2300000		Cubic metre
Erosion Total Per Year			-4130000	Cubic metre
Erosion per metre per year			**-31,7692308**	Cubic metre
Beach Nourishment				
Beach Nourishment north		775000		Cubic metre
Beach Nourishment south		1625000		Cubic metre
Beach Nourishment Total			2400000	Cubic metre
Beach Nourishment per metre per Year			18,4615385	Cubic metre
Netto Result			-1730000	Cubic metre
Erosion per metre per year			-13,3076923	Cubic metre

fig. 3

As it appears in Appendix 3.2, the West coast of Jutland is beach nourished every year
with 2.4 mill. m^3 sand; however the yearly erosion is 4.13 mill. m^3 which is shown in Appendix 1
and fig. 3.

Thus, the result of the beach nourishment on the West coast of Jutland is overall negative
with a yearly erosion rate of 10 m^3 per metre as opposed to the SIC System which is showing a
positive profile of 5 – 10 m^3

The SIC system is creating a naturally balanced profile whereas beach nourishment is causing steep
profiles prone to increased erosion. The erosion on the West coast of Jutland is now approximately
32 m^3 per metre per year – whilst beach nourishment is implemented.

In addition to the erosion comes a significant strain on the environment which is causing
declining fish populations and a substantial CO^2 pollution.
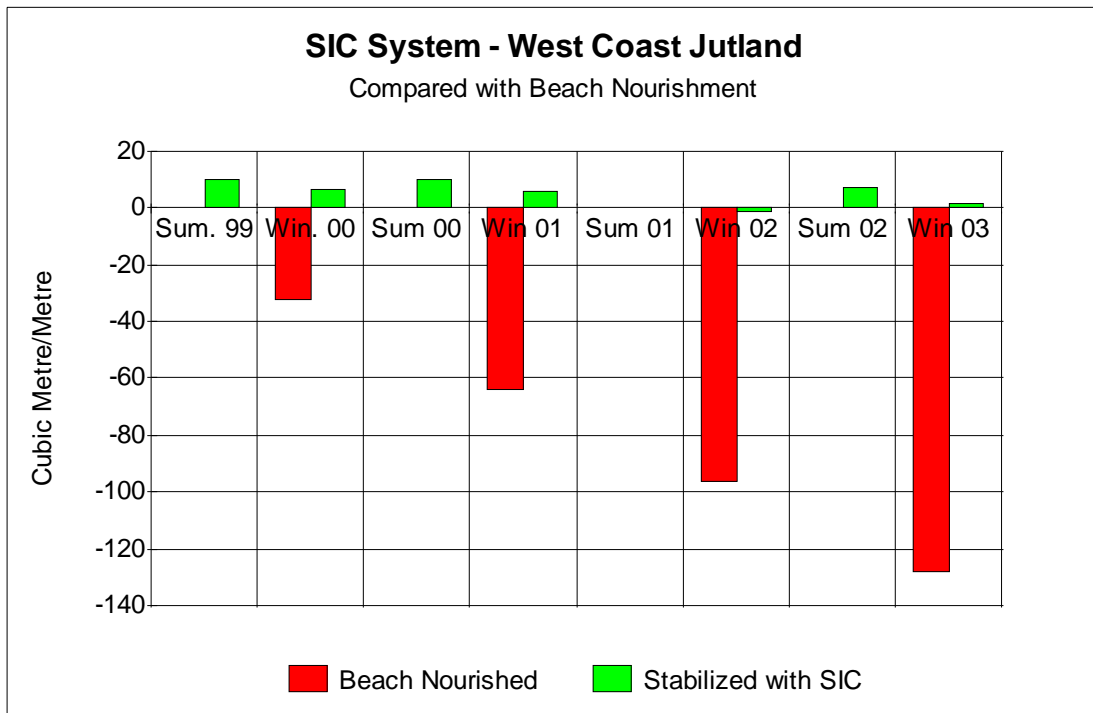
Value for Money

Fig 4

As illustrated in fig. 4 the SIC-treated beach is stabile due to the fact that during the summer season a "buffer" is built up which is sufficient to withstand the winter storms.

Contrary to the SIC-treated beaches, erosion is occurring at a rate of 32 m^3 per metre in the beach nourished areas according to the KDI record of sediment movement, Appendix 3.1.

Subsequently the erosion on the Jutland West Coast amounts to 4.130.000 cubic metres per year, which will cost 22.6 million USD to maintain through beach nourishment in order to keep the beach stabile.

The SIC system therefore has a real value of 22.6 million USD per year if implemented on the Jutland West Coast, because it is far more effective in stopping erosion than the present beach nourishment of 2.4 million cubic metres per year. As the SIC system only costs 3.8 million USD to operate and maintain, the savings would be 18.8 million USD and thus a far greater asset to society than previously estimated.

Skagen, 14. September 2003.

Poul Jakobsen

Appendix 3.1

Appendix 3.2.