

Scotland in Scotland (Szkocja w Szkocji)

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Prof. Dr. Kazimierz Trafas passed away unexpectedly on the 3rd November 2004. He was a very colourful character. A recognised authority in cartography and remote sensing, he originated and accomplished many theoretical and practical projects in his lifetime. Yet there is one undertaking in his rich output that, surprisingly, has never appeared in any publication.

It was the beginning of the 1970s, the decade of Edward Gierek [*4th First Secretary of the Polish United Workers' Party – ed.*]. Gradually, it became noticeable that the People's Republic of Poland was opening up to the world: Coca-Cola was available for the first time, Swedes were building the hotel 'Forum' in Warsaw, *Pewexes [hard currency shops – ed.]* were opening; Polish émigrés were visiting the homeland more often. At this time Professor Mieczysław Klimaszewski (director of the Institute of Geography at the Jagiellonian University and Rector of the University) was deputy Chairman of the National Council as well as Chairman of the Supreme Council of the Association for Communications with the Polish Diaspora (known as 'Polonia'). During one of its conventions a Pole from the United Kingdom revealed to Professor Klimaszewski his unusual geographical-cartographical idea – the creation of a three-dimensional map of Scotland in the grounds of his hotel.

The originator of the idea was Mr. Jan Tomasik, a businessman permanently resident in Scotland - born in Krakow, a builder by trade and a UK citizen by choice. After the defeat of Poland in 1939 he had succeeded in reaching Britain where he joined the newly organised 1st Armoured Division under the command of General Stanisław Maczek. In the campaign to liberate Europe he marched across France, Belgium,



Holland and Germany, as far as Wilhelmshaven. After the war he returned to the UK, first to London, then to Edinburgh. After years of hard work in hotels he became a hotel owner. At the end of the 1960s he sold his hotel in Edinburgh and bought the estate of 'Black Barony' in the Scottish county of Peeblesshire, about 25 kilometres to the south of the city. Black Barony, or Barony Castle, occupies over 10 hectares of the western side of the valley of the Eddleston Water among a range of hills rising to 100 meters above the valley floor and situated west of the Moorfoot Hills and south of the Pentland Hills. The property included forests, pastures and grounds, and above all, a splendid castle from 1536, rebuilt in the 18th century. Why, from a Polish perspective, did someone from Poland buy a castle in a far away place like Scotland? And why did he want a concrete map of Scotland built in its grounds?

The history of Poles and Polish military organisations in Western Europe during the Second World War was carefully concealed [*by the communist authorities – ed.*] during the period of the People's Republic. After Poland's defeat in September 1939 many Polish soldiers arrived in Britain, having journeyed through Hungary, Romania, Italy, the Near East, Morocco and France, avoiding areas under Nazi occupation. Regrouped in Scotland, the Polish 'army in exile' was entrusted with the defence of a substantial stretch of the Scottish coast against sudden attack and invasion from Nazi-Occupied Norway. The Poles' task was to patrol the coast and install anti-tank obstacles and barriers along the beaches from Montrose in Angus south to the River Forth.

Jan Tomasik was a soldier of Maczek, stationed at one time during the war in Galashiels, about 14 miles from Barony Castle. From September 1942 through the D-Day offensive of June 1944 to the end of the war, the castle was the main Staff College for the Polish Forces in Scotland. It is perhaps not surprising that long after the war Mr. Tomasik was happy to return to a place which had a strong association with the wartime presence of the Polish Army.

Professor Klimaszewski told his assistants Kazimierz Trafas and Roman Wolnik about his conversations with Jan Tomasik. Construction of a Map of Scotland on a big scale outdoors and using unconventional cartographic methods would be a challenge. Young Kazimierz Trafas prepared the project. An area of about 50 x 60 metres of flat ground on the slopes of Black Barony was chosen as a suitable location. The whole three-dimensional structure showing the landscape of Scotland and the Hebridean islands would be built within a sunken area surrounded by trees and bushes. The border between Scotland and England would meet

the edge of the basin. The ground allocated for the structure allowed the map to be built to a scale of 1:10,000. Another important consideration was the best choice of vertical scale to pinpoint accurately relative heights above sea level, or rather, in this particular case, above the level of water in the basin. Scotland is a country of hills. There are not many high mountains by Alpine standards (Ben Nevis is 1,343 meters above sea level), but despite its small area there are considerable differences in height which make it ideal for three-dimensional representation. Adopting a scale of 1:10,000 the height of Ben Nevis in the same vertical scale would be only 134 millimetres above the level of water in the basin. It was proposed to increase the vertical scale by a factor of 5, which in the case of Ben Nevis meant that it would reach a height of 67 centimetres. This height gave a suitably good impression of the terrain.

There were no detailed maps of Scotland available in Krakow, so Mr. Tomasik had to deliver the required source data. While engaged in studying Scotland's terrain, Trafas had an idea for a side-project. He proposed creating a similar model of the map but on a smaller scale. If the large model was to fill the available space outdoors, the small one could be installed indoors inside the castle. This would allow it to be viewed regardless of the weather. Both models were created almost simultaneously. The construction of the small model had to be done initially at the University in Krakow. In May 1974, Trafas (shortly after defending his doctoral thesis) set out for Scotland, accompanied by Roman Wolnik. They took cartographic materials and essential geodesy equipment. When they arrived, they prepared the site. One metre of soil and subsoil was removed and the bottom of the excavated pit carefully levelled. The first step was to install a local Cartesian coordinate system using taut strings to mark latitude and longitude. The next step involved delineating the coastline on the floor of the pit. This was done by vertical wooden shuttering. Once in place it was partially filled in with soil and rubble before being stabilised with concrete. The height of the coastal shuttering was 50 centimetres from ground level and regularly checked by Mr. Robson, the hotel's maintenance man, who was used to helping with any building tasks needing done. After fixing the coastline, which formed a datum for the terrain, levels and terraces were established at discrete contour heights

It soon became obvious that the work was taking longer than envisaged; the men had planned to stay in Scotland for only a few weeks. Through lack of time the number of levels had to be limited to three, representing 300, 600 and 900 metres above sea level. Creating the terraces was undertaken in the same way as the coastline, by shuttering and infilling.

At this point the work was suspended. The weeks had passed very quickly and the builders had to leave Scotland and its enchantments. On the one hand, Mr. Tomasik was happy with the progress to date - something had been achieved. On the other hand, he knew that the whole project would now be placed on hold till the following summer. Eventually, after a few months had passed, he decided to bring more "map makers" to Scotland in the following year to speed up completion of the project. Every break in a project has its positive side, for it allows people to stand back and look critically and constructively at previously agreed plans. It gave Mr. Tomasik sufficient time to build up the model according to plan. For his part, Dr. Trafas focused on the making of the small model. Now, it is important to appreciate that the year was 1974 or 1975. Pocket calculators were new, there were only four bulky and heavy operational colour television sets in the country, and the first "maluchs" [*Fiat 126 p – ed.*] were taking to the roads. Maps were still drawn manually, but with the assistance of drafting pens. In an atmosphere of constant technical progress, Trafas decided that the small model of Scotland would be made from gypsum to a scale of 1:500,000 (with a 5-times vertical enhancement) using modern technology for the time. After consulting with colleagues from technical academies, he assumed that having detailed cartographic material on Scotland's topography would allow him to make the map using a special mechanical moulding machine. The preparation of output data was based on copying a specified set of contour heights from a cartographic map to a printed circuit board of a type already in use in consumer electronics. In this way, a set of contours was represented by conducting on a printed circuit board. The value of a contour height was represented by a proportional voltage. The greater the contour height, the higher the voltage. In this way, differences of heights, levels and drops between contours on the map were represented by voltage differences. The voltages provided the height information for the moulding machine which carved the block of plaster. The idea of using a mechanical device to make the model was highly original. Unfortunately, the device and method of transmitting data proved to be disappointing, because some parts needed manual corrections. The entire model comprised four quarters (because of the parameters of the machine). This white plaster model of Scotland was certainly an impressive example of the broad possibilities for interpreting a classic map that could have further applications. However it had one defect – it was difficult to repeat the process, in other words to produce a copy. Trafas was fully aware of this. For every section of the map, duplicates were made, and imprints produced in a shrink film, in the same way that plastic relief maps are produced today.

In May 1975, Jan Tomasik drove to Krakow in the hotel's transit van. He brought back the plaster model and plastic impressions of Scotland, along with three contract workers: Zygmunt Olecki, Jerzy Zelech and the author. Once in Scotland the very first thing the group had to do was correct the state of the shuttering after a gap of 10 months. The team now faced the most difficult stage of the project – the manual modelling to achieve the shapes of hills and glens. This method of modelling required a special spatial and geometric imagination. Guided by the colour-shaded contours of Bartholomew's topographic maps, it was essential to visualise the spatial layout of the terrain, and then to fill the space manually with sculpted concrete. To maintain the correct ratio of height, summits were represented physically on the model by a set of vertical rods with height proportional to altitude. On the one hand, the difficulty in modelling came from the small number of shuttered height terraces and rods representing height, and, on the other, from the limited time available to mix each batch of concrete. Any subsequent corrections required the use of heavy equipment to break through a hard crust and were time consuming. The modelling was undertaken by working in two pairs. One person formed the general shape from the batch; the second finished off by making the final, detailed shape. A fifth person was responsible for making and delivering the batches of concrete to the area where the modelling was taking place. Two types of concrete mixes were made: coarser aggregate for the lower layer and finer aggregate for the surface topography. During the modelling process, regardless of geometrical considerations, it was essential to consider the function and use of the model. It would exist in the open air. That meant it would be exposed to changing weather conditions. That is why the external layer of concrete had to have a different composition and be more carefully modelled than the base layer. Scotland is a country of many rivers and lakes - its famous 'lochs'. Several months into the break in the work, Mr. Tomasik concluded that lochs and rivers should be included on the model. Therefore, the modelling was undertaken in parallel with the installation of pipes intended to supply water for these. The idea of a water network was imaginative, but caused additional technical and construction problems. The technology used to create the concrete map had nothing in common with the classic methods of cartography. Finally, on 24th July 1975 - Tomasik's name day - the model was finished. The traditional topping out ceremony took place on Ben Nevis. Mr. Tomasik expressed his satisfaction with the overall result, but made some further final changes. The pool was to be oval shaped rather than rectangular.

One year later, in the summer of 1976, Trafas and Wolnik, the creators of the concrete Map of Scotland, visited Barony Castle for their third and, as

it turned out, final visit. Jan Tomasik wasted no time. Hotel workers painted the model in the early spring: forest and urban areas were shown, rivers and lochs were supplied with water, the basin wall was coated with a sealant. The final step was the modelling of a few islands. The basin was to be filled with dyed water so that an observer's gaze would be focused on the map rather than the bed of the basin; and it was planned to build a metal walkway over the model to allow visitors to view it close up without stepping on it. This visit was Trafas's last personal contact with and input into the Map of Scotland, Barony Castle and Scotland [*a Tomasik family member has suggested that Trafas and Wolnik may have made another brief visit in 1977 – ed.*]. Jan Tomasik's health began to decline and he passed away a few years later. Barony Castle changed ownership. For a long period the fate of the large concrete map and that of the small plaster model of Scotland were unknown. According to unverified information, there is an intention to restore the map after many years and open it to the public in 2005. Making the small model and building the concrete map was a bold and unusual cartographic project at the time, even more so when viewed from the contemporary context of 21st century digital cartography. We deal every day with different ways of adapting the classic map form, be it through a plastic map, panoramic map or anaglyph map. Each aims at achieving a better spatial representation of the Earth's physical surface. A concrete terrain map on such a large scale is very unusual, if not unique. The final question is: should similar models appear in other places such as Tatry, Bieszczady, Beskidy [*Polish mountains – ed.*] - not just as tourist attractions, but primarily as instruments for geographic and cartographic education?

I dedicate this reminiscence to the memory of those who have passed away: Stanisław Maczek, Mieczysław Klimaszewski, Kazimierz Trafas, Jan Tomasik and my father, a soldier of General Maczek.

Janusz Szewczuk

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Photographs from the original article in Polish:



Zdj. J.Zelech

Ryc.4. R. Wolnik i Z. Olecki przy transporcie „tworzywa kartograficznego”

R. Wolnik and Z. Olecki moving “cartographic building material”



Ryc. 3. Ogólny widok modelu (czerwiec 1975)

Zdj. J. Szewczuk

General view of the model (June 1975), photo by J. Szewczuk



Ryc.2. Fragment modelu Szkocji

Section of the model, photo by Jerzy Selech



Ryc.1. K. Trafas i R. Wolnik w czasie przerwy – w tle zamek Barony Castle

K. Trafas and R. Wolnik taking a break—Barony Castle in the background [inadvertently reversed image – ed.]



Ryc. 5. M. Ratoń, R. Wolnik, Z. Olecki i J. Szewczuk – konsultacje na fragmencie modelu

M. Raton, R. Wolnik, Z. Olecki and J. Szewczuk discuss a section of the model