

The seasonal nature of tourist flows in relation to meteorological conditions as illustrated by the case of Zachodniopomorskie Voivodeship

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Abstract. The analysis is based on the materials published by the Statistical Office in Szczecin for 2000–14, presented on a monthly basis, concerning the total number of tourists (including foreign tourists) and the overnight stays. The distribution of the number of tourists and their accommodation per month and season was correlated with mean monthly values for air temperature, cloudiness and wind speed. Meteorological data for the period 2000–14, as averaged for the whole voivodeship, was obtained from four IMGW stations (Świnoujście, Koszalin, Szczecin and Szczecinek). Statistical analysis was conducted and time trends of the number of tourists and overnight stays were identified for individual months with the use of linear and polynomial regression. The seasonal nature of tourist flows was assessed by the number of tourists and accommodation provided for tourists in summer compared to winter, and spring to autumn. Air temperature and cloudiness were found to have the greatest effect on the uneven distribution of tourist numbers across a year. Each year, approximately 1.7 million tourists visit Zachodniopomorskie Voivodeship, 1.1 million of which (i.e. 66%) stay on the coast.

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1. Introduction

The seasonal nature of tourism is defined as a temporary imbalance in the number of tourists in a given area. In Poland this is determined by climate, as well as by holiday arrangements, winter and summer vacation schedules, tourist infrastructure and the frequency of weekend and holiday trips (Panaś, 2000; Koźmiński et al., 2013). Over the last few years, increasing activity by senior citizens has resulted in a decrease of seasonality in tourism as they are likely to go on holiday out of the summer season (Przeclawski, 1997; Głabiński, 2015). The following factors can also affect the temporary imbalance of tourist flows – *ecological*: lengthening of the tourist season will result in an increase in the anthropogenic impact on the environment and hence generate conflicts; *economic*: the development of social tourism to a large extent depends on a harmonious combination of social and economic goals; *legal*: lack of explicit legislative instruments on the part of local authorities regulating the principles supporting recreation; *socio-demographic*: subject to ongoing changes in the structure of the family, population ageing, increasing unemployment and the deteriorating standard of living of some social groups (Stasiak, 2011). The climatic factors which most affect the size and variability of tourist flows include sunshine duration, cloudiness, air and water temperature, wind speed and the number of days with precipitation (Koźmiński, Michalska, 2014). Ongoing global warming will contribute to the lengthening of the tourism season, including the bathing season, on the coast as well as in lake and mountainous areas. Alongside the positive effects of climate change on tourist flows, there is an increase in the intensity and frequency of adverse weather phenomena such as heavy precipitation, storms, heat waves, droughts and fires etc – elements which disturb leisure activities (Starkel, 2003; Starkel, Kundzewicz, 2008; Koźmiński, Michalska, 2015). An excessive concentration of tourists on the Polish Baltic Sea coast in July and August has a heavy impact on the environment thus increasing the holiday burden (Pawlikowska-Piechotka, 2009; Parzych, 2011). Lake districts are another tourist destination region, characterized by various landscape and tourist attractions and, as compared with

the coast, favourable bioclimatic conditions (Lijewski et al., 2002; Koźmiński, Michalska, 2004; Błażejczyk, Kunert, 2011). Differences in the length of the bathing season to a large extent determine the intensity and structure of tourist flows in particular months of the holiday season (Parzych, 2011).

The aim of the present paper is an assessment of variability and seasonality in the number of tourists and accommodation provided for them in Zachodniopomorskie Voivodeship in relation to meteorological conditions.

2. Materials and methods

The materials published by the Statistical Office in Szczecin for the period 2000–14 were the basis for the assessment (Statistical Office 2000–14). The monthly data concerned the total number of tourists, the number of foreign tourists and accommodation provided. Data for five coastal poviats (Kamień Pomorski, Gryfice, Kołobrzeg, Koszalin and Sławno) was taken into consideration for the purpose of determining the intensity of tourist flows relative to the whole voivodeship.

The distribution of the number of tourists and overnight stays in individual months and seasons has been correlated with monthly values of air temperature, cloudiness, wind speed, and the number of days with precipitation, and presented in the form of tables and figures. Due to a lack of measurements of sunshine duration, data on cloudiness (on a scale from 0 to 8 octants) was used instead. Meteorological data for the period 2000–12, obtained from four IMGW stations (Świnoujście, Koszalin, Szczecin, Szczecinek), were averaged for the whole voivodeship (Fig. 1).

Data concerning the number of tourists and accommodation in individual months were statistically analysed and time trends determined with the use of linear and polynomial regression and the coefficients of determination R^2 . The distribution of the annual number of tourists and overnight stays (per domestic and foreign tourist) in relation to the three meteorological elements was determined using linear and second degree polynomial regression. The significance of the relationship between the analysed variables was calculated at a level of $\alpha = 0.05$ and $\alpha = 0.01$.



Fig. 1. Location of Zachodniopomorskie Voivodeship in Poland

Source: Authors

The percentage increase in the number of tourists and accommodation per month was determined on the grounds of the difference between the number of tourists and accommodation calculated from a linear regression equation for 2014 compared to that from 2000 (Fig. 2). The seasonal nature of tourist flows was determined using the ratio of the number of tourists and accommodation provided in summer to that provided in winter, and the respective data for spring and autumn. Additionally, the number of overnight stays was divided by the number of tourists which gave monthly and seasonal lengths of stay in Zachodniopomorskie Voivodeship.

3. Analysis of results and discussion

The analysis of the warm half-year (April–September) in the period from 2000 to 2014 in Zachodniopomorskie Voivodeship (Fig. 2) revealed a positive and statistically highly significant trend in the total

number of tourists ($r = 0.924$), including both domestic ($r = 0.872$) and foreign tourists ($r = 0.650$) in both halves of the year – cold and warm.

In terms of the number of domestic tourists, the increase recorded in the analysed period was quite balanced, as opposed to the increase in foreign tourists which showed greater imbalance. In the period 2000–14, the total number of tourists in Zachodniopomorskie amounted to 1,690,837, of which 66% spend their holiday on the Baltic Sea coast, constituting a significant environmental burden and negatively affecting sustainable development in the region, as has been argued by Zaręba (2012). According to Bigović (2012), high seasonality may contribute to an excess of tourist capacity and absorption in the main season which may lead to environmental degradation, an increase in accommodation prices, and difficulties in planning this tourist burden and managing tourist facilities. In the period from January to December, the number of tourists shows an uneven distribution as 47.6% of tourists take their holiday in summer (June–August), 20.7% in autumn (September–November), 19.8% in spring (March–

May) and only 11.9% in winter (December–February) – 36.1% of the total number, and lowest in January and December – 7.8%.

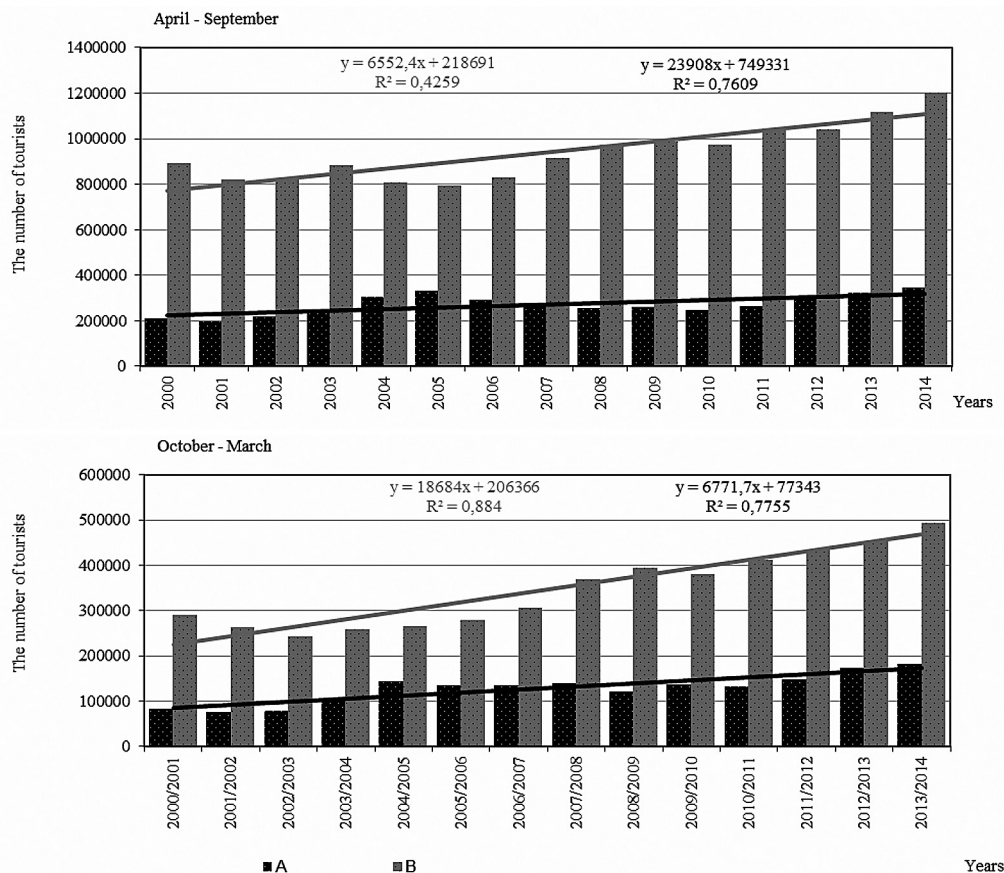


Fig. 2. Distribution of the number of foreign (A) and domestic tourists (B) in the warm half-year (April – September) and cold half-year (October – March), together with the trend in Zachodniopomorskie Voivodeship

Source: Authors

Foreign tourists amount to 23.7% of the total, and show a more balanced distribution in individual seasons in comparison with domestic tourists. In summer, the share of foreign tourists in relation to the whole year amounts to 39.5% and domestic to 52.2%, whereas in winter it is 12.3% and 11.5% respectively. In turn, the percentage ratio of foreign tourists to domestic is highest in October – as much as 47.4%, and in September – 40.4%, it is the lowest in July – 22.0% and August 24.0% due to the inflow of foreign tourists to sanatoria and spas in autumn and early spring (Table 1).

It should be stressed that seasonality of tourist flows cannot be eliminated only limited, for example by new tourist investment and the development of spa tourism (Goeldner, Ritchie, 2003; Bender et al., 2005). For these reasons, academics as well as

those in the industry address the issue of the seasonal nature of tourism (Borzyszkowski, 2014).

Of the five coastal poviats, the highest number of tourists in a year is recorded in Kołobrzeg and Kamień Pomorski as many sanatoria are located there – each powiat hosts approximately 22% of the total number of tourists in the whole voivodeship. The number of tourists in the remaining three poviats was significantly lower – from approximately 6% in Sławno to 10% in Koszalin. Although the analysed period shows a positive and statistically highly significant trend, the number of overnight stays only shows a positive trend, apart from Kołobrzeg and Koszalin poviats where a positive and statistically significant trend was found. According to Bender et al., (2005), the least seasonality is found in urban areas, and the highest in tourist regions.

Table 1. Average total number of tourists, both foreign and domestic, and accommodation provided in Zachodniopomorskie Voivodeship: 2000–14

Average number of tourists/month	January	February	March	April	May	June	July	August	September	October	November	December	Year
a	63,369	68,455	82,849	102,090	149,645	194,278	316,341	294,966	154,389	110,738	84,409	69,309	1,690,837
b	14,227	15,954	23,609	28,284	40,289	44,097	57,014	57,038	44,387	35,613	20,861	18,915	400,289
c	49,142	52,501	59,240	73,806	109,356	150,180	259,327	237,928	110,002	75,124	63,547	50,394	1,290,548
d	256,954	328,045	402,263	491,563	786,604	1,148,770	2,202,468	1,988,614	882,776	550,768	396,119	309,911	9,744,854
e	65,320	86,426	131,678	142,440	191,110	214,515	255,002	262,399	243,950	186,160	101,713	89,258	1,969,970
f	191,634	241,619	270,585	349,123	595,494	934,255	1,947,467	1,726,215	638,826	364,608	294,406	220,653	7,774,884

Key: a – total number of tourists; b – foreign tourists; c – domestic tourists; d – total number of overnight stays; e – overnight stays for foreign tourists; f – overnight stays for domestic tourists

Source: Authors

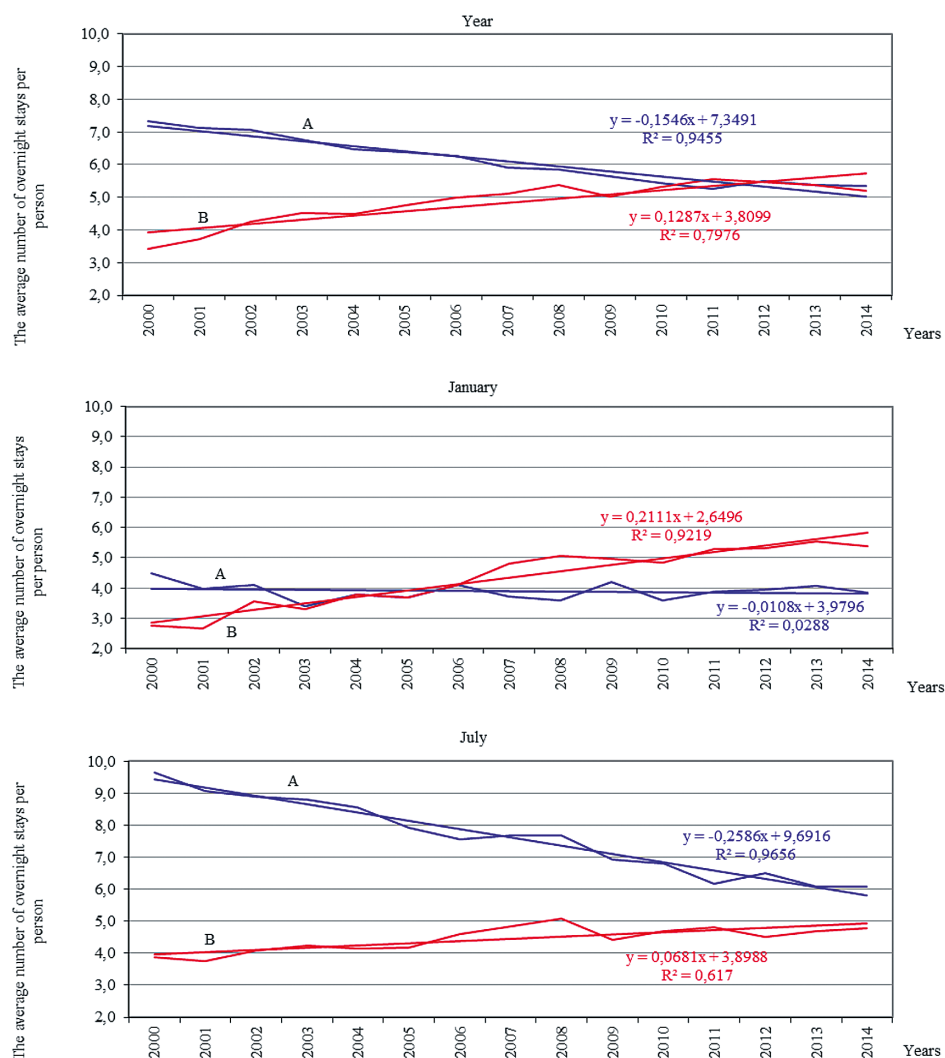


Fig. 3. The average number of overnight stays per domestic tourist (A) and foreign tourist (B) annually together with trends in January and in July in Zachodniopomorskie Voivodeship

Source: Authors

In the analysed period of 2000–14, the number of overnight stays in Zachodniopomorskie Voivodeship amounted to 9,744,854, out of which 7,774,884 were domestic tourists which, on average, can be calculated as 6.0 overnight stays a year per person. The number of overnight stays provided for foreign tourists was 1,969,970 which translates into 4.9 overnight stays per person (Table 1). The data for the period presented in Fig. 3 shows a statistically highly significant and negative trend of the average number of overnight stays per domestic tourist, as in 2000 the average was 7.3 and in 2014 – 5.3.

However, the number of foreign tourists shows a positive, statistically highly significant trend, as in the year 2000 the number of overnight stays per foreign tourist was 3.4 and in 2014 – 5.2. A significant decrease in the number of overnight stays per domestic tourist is recorded in the summer months, especially in July – from 9.6 in 2000 to 6.1 in 2014, with a relatively slight increase in the number of overnight stays for foreign tourists – from 3.8 to 4.8 (Fig. 3).

The seasonality of tourist flows in the 15-year period under analysis in Zachodniopomorskie Voivodeship, expressed as the ratio of total number of tourists in summer (June – August) to that recorded in winter (December – February), is from 3.4 in 2012 to 5.9 in 2003, with an average of 4.2 and a significant decrease in subsequent years. Analysed seasonality recorded among foreign tourists is lower and ranges from 2.6 in 2008 to 5.2 in 2003, with an average of 3.5 which confirms the decreasing trend. However, the number of domestic tourists, as compared to the number of foreign, shows a

greater imbalance – from 3.6 in 2012 to 6.1 in 2003, with an average of 4.4 which represents a significant decrease in seasonality for this group of tourists. In Zachodniopomorskie Voivodeship, particularly on the Polish Baltic Sea coast, the seasonality of tourist flows in a given year is generally high and causes problems for planning, organization and providing services for tourists and sanatorium in-patients. There are years in which large differences in the value of the seasonality ratio are observed, for example for domestic tourists: 6.1 in 2003 which was marked by a cold winter and a hot summer; and 5.0 in 2004 characterised by a relatively warm winter, cold June and July, and a very warm August (Koźmiński et al., 2012).

The seasonal nature is clearly represented in the distribution of the total number of overnight stays – in summer it amounts to 54.8% and in winter to 9.2% of the annual total. The number of overnight stays provided for domestic tourists shows an uneven distribution per month, as compared with the number of overnight stays provided for foreign tourists. For example, in summer (June–August), accommodation provided for domestic tourists amounted to 59.2%, and for foreign tourists 37.1%; in winter (December–February) the values were 8.4 and 12.2% respectively, against the total annual number of tourists from a given group (Fig. 2). A very large decrease in the number of overnight stays provided for domestic tourists is recorded from August – 22.2%, to September – 8.2%, as opposed to the number of overnight stays provided for foreign tourists which shows a slight decrease – August 13.3% and September 12.4% (Table 2).

Table 2. Accommodation (%) provided for domestic (a) and foreign (b) tourists on a monthly basis

Accommodation/ /month	January	February	March	April	May	June	July	August	September	October	November	December	Year
A	2.5	3.1	3.5	4.5	7.7	12.0	25.0	22.2	8.2	4.7	3.8	2.8	100%
B	3.3	4.4	6.7	7.2	9.7	10.9	12.9	13.3	12.4	9.5	5.2	4.5	100%

Key: A – domestic tourists; B – foreign tourists

Source: Authors

The analysed period of 2000–14 is marked by highly significant negative trends in the ratio of the number of tourists and overnight stays (beds) provided between summer and winter. An exceptionally high decrease in the ratio in the number of overnight stays provided for domestic tourists is recorded – from 11.7 in 2003 to 5.3 in the period

2012–14; for foreign tourists – 5.6 in 2000 and 2003, to 2.4 in 2013.

In the light of data presented in Table 3, a marked increase is observed in the period 2000–14 in the total number of tourists in Zachodniopomorskie in the autumn and winter months, particularly in February – 142%.

Table 3. Increase (%) in the total number of tourists – (a) including domestic (b) and foreign tourists (c) – and the total number of overnight stays (d) provided for domestic (e) and foreign tourists (f) in 2014 as compared to 2000

%	January	February	March	April	May	June	July	August	September	October	November	December	Year
a	117	142	107	62	34	32	41	36	62	111	123	102	60
b	109	125	100	67	40	35	44	37	75	128	120	123	60
c	163	185	127	52	25	23	45	45	54	100	117	117	67
d	147	147	120	60	16	20	7	3	42	97	124	126	25
e	97	90	70	38	3	10	17	14	25	70	90	93	11
f	610	490	330	220	180	86	73	78	106	175	410	250	130

Key: % – increase in tourists; a – total number of tourists; b – domestic tourists; c – foreign tourists; d – total number of overnight stays; e – overnight stays for domestic tourists; f – overnight stays for foreign tourists

Source: Authors

The increase recorded in the period from May to August, particularly in June – 32%, is small. This increase is mainly due to inflow of foreign tourists to the voivodeship in the cold half-year – from 100% in October to 185% in February (Table 3). A comparable increase can be determined as for the total number of overnight stays provided in the cold half-year – from 97% in October to 147% in January and February, and for the overnight stays provided for foreign tourists – from 175% in October to as much as 610% in January. The negative trend in the number of overnight stays provided for domestic tourists in July (-17%) and in August (-14%) was noticeable, which only confirms the trend of shortening holidays. Recently, instead of a longer holiday period of 7–14 days in length, tourists favour short-term weekend and holiday breaks which are said to have a beneficial effect on both physical as well as mental health after periods of hard work (Bowen, 2002; Zaręba, 2012). This trend is underpinned by an improving hotel infrastructure and service sector, and also by the fact that more families own a car, while the quality of access roads to tourist destinations as well their infrastructure are improving (Pawlikowska-Piechotka, 2009; Zaręba, 2012; Koźmiński et al., 2013). According to Głąbiński (2015), retirees and

pensioners contribute to a large extent to a decrease of seasonality in tourist flows as they prefer to travel in autumn and spring. Also, seasonality is dependent on the type of a region and its tourist function – the metropolitan type exhibits a largely even distribution over a year, and the leisure/recreational type is marked by a temporal imbalance in the number of tourists (Liszewski, 2009).

As data presented in Table 4 show, in four selected years 2005, 2006 and 2013, 2014, the number of tourists on the coast relative to the total number of tourists in Zachodniopomorskie rose from 64.3% in 2006 to 70.8% in 2014.

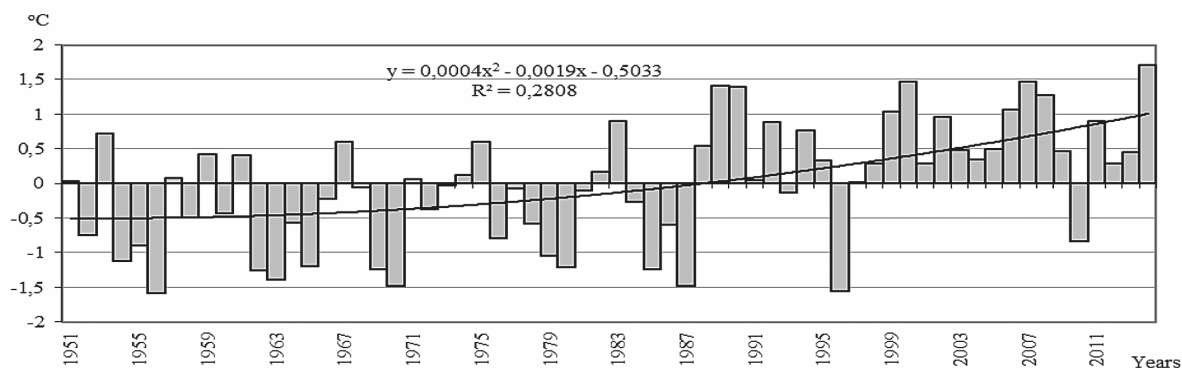
In terms of accommodation, the share is ever more prominent – from 86.7% in 2006 to 87.7% in 2014, particularly in Kołobrzeg powiat: 29.1 and 35.5% respectively. The number of overnight stays provided for tourists in Sławno powiat is the least – 9.0% in 2014 and 11.2% in 2005.

However, as has already been shown, an increasing frequency of weekend and holiday breaks makes the variation in the number of tourists in different seasons less prominent. Ongoing global warming, which has intensified in West Pomerania since 1987 (Fig. 4), is believed to be another factor which plays an important role in decreasing the seasonal nature of tourist flows.

Table 4. The share (%) of the total number of tourists and accommodation, according to year and powiat, in the total number of tourists in Zachodniopomorskie Voivodeship

Powiat	Number of tourists				Accommodation			
	2005	2006	2013	2014	2005	2006	2013	2014
Kołobrzeski	19.1	19.0	24.8	25.8	30.1	29.1	34.4	35.5
Koszaliński	8.1	7.6	7.5	6.9	9.6	9.1	8.6	8.6
Sławieński	6.4	6.0	5.5	5.8	11.2	10.4	9.5	9.0
Koszalin	2.3	1.9	2.4	2.2	0.6	0.5	0.8	0.7
Gryficki	6.6	8.9	8.2	8.5	9.5	11.9	9.4	9.8
Kamieński	14.6	13.7	10.9	11.3	15.9	15.4	12.2	11.9
Świnoujście	7.6	7.2	10.1	10.3	10.4	10.4	12.6	12.2
Total of Coast	64.7	64.3	69.4	70.8	87.1	86.7	87.4	87.8

Source: Authors

**Fig. 4.** Deviations from the mean annual air temperature in Zachodniopomorskie Voivodeship in the period 1971–2014

Source: Authors

The quantitative relationship between the monthly number of tourists, as well as that of domestic and foreign tourists, and monthly air temperature (averaged from 4 stations) is presented in Fig. 5.

There is a statistically highly significant positive relationship (r from 0.873 to 0.919) between the analysed variables. A particularly large increase in the number of domestic tourists is observed when the temperature is above 10°C which, on average, occurs in the north-west of Poland as early as the be-

ginning of May. In the case of foreign tourists, the numbers increase steadily along with an increase in temperature.

Cloudiness was shown to have a significantly smaller influence on the number of holiday-makers in Zachodniopomorskie Voivodeship. However, when cloudiness is reported to be above 5 octants (on a scale of 0–8), which takes place mainly in the cold half-year, the number of tourists decreases (Fig. 6).

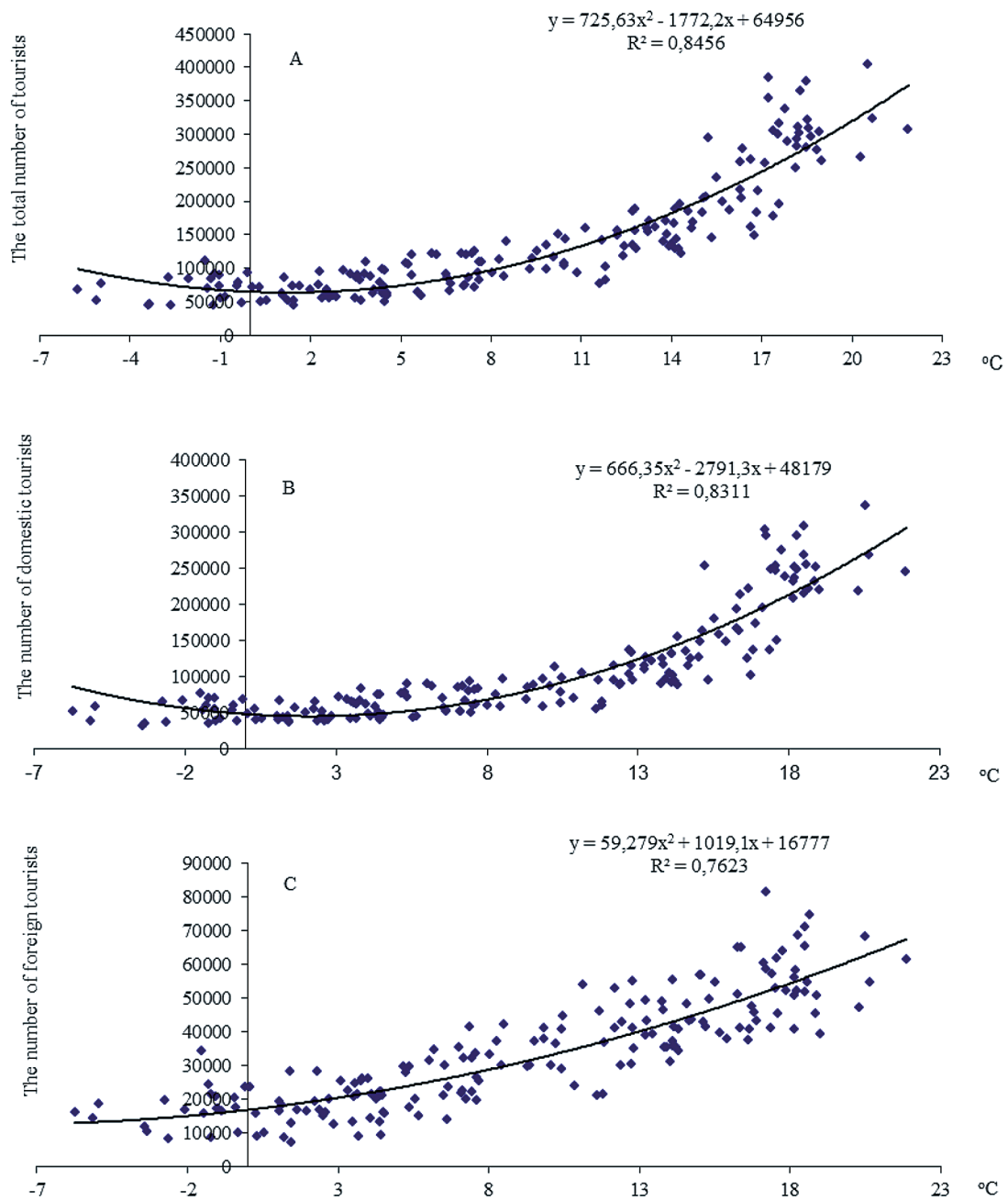


Fig. 5. Distribution of the total number of tourists (A), domestic tourists (B) and foreign tourists (C) against monthly air temperatures in Zachodniopomorskie Voivodeship: 2000–2014

Source: Authors

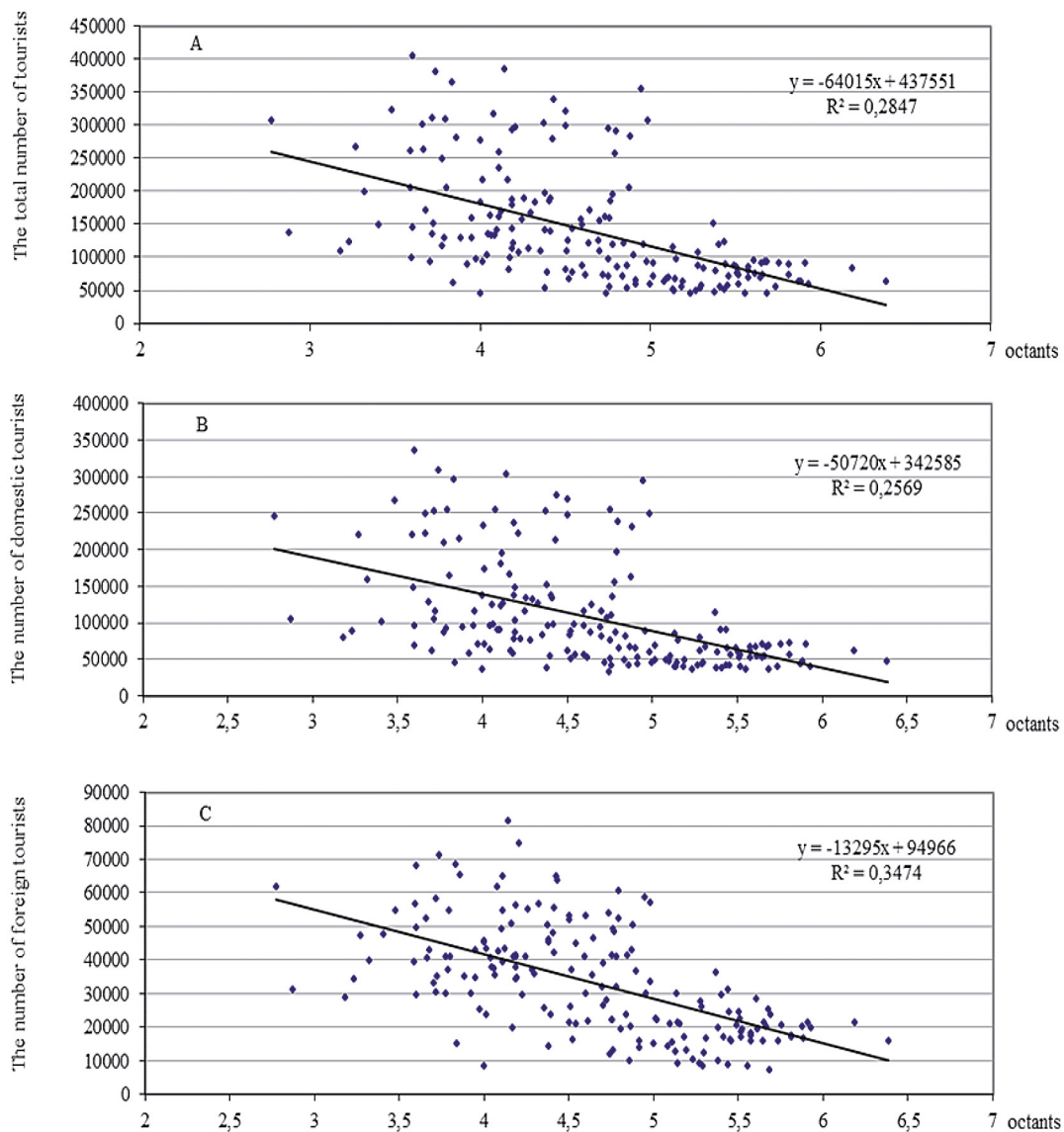


Fig. 6. Distribution of the total number of tourists (A), domestic tourists (B) and foreign tourists (C) against monthly cloudiness in Zachodniopomorskie Voivodeship: 2000–14

Source: Authors

As presented in Fig. 7 increased wind speed ($> 4 \text{ m}\cdot\text{s}^{-1}$) can have a negative effect on the decision to go on shorter holidays, especially to coastal destinations. In the coastal zone, the greatest daily wind speeds ($>4 \text{ m}\cdot\text{s}^{-1}$) are reported in the period from November to March. Wind speed recorded during a 24-hour period is often higher than $8 \text{ m}\cdot\text{s}^{-1}$ which, from a biometeorological stance, constitutes

a burden for a human organism (Koźmiński *et al.*, 2004; Błażejczyk & Kunert, 2011). Such wind speed values are usually accompanied by the passing of atmospheric fronts and large pressure gradients which, together with large variations in temperature and cloudiness, contribute to an increase in climate stimuli in the coastal zone (Chabior, 2004; Kozłowska-Szczęśna *et al.*, 2004).

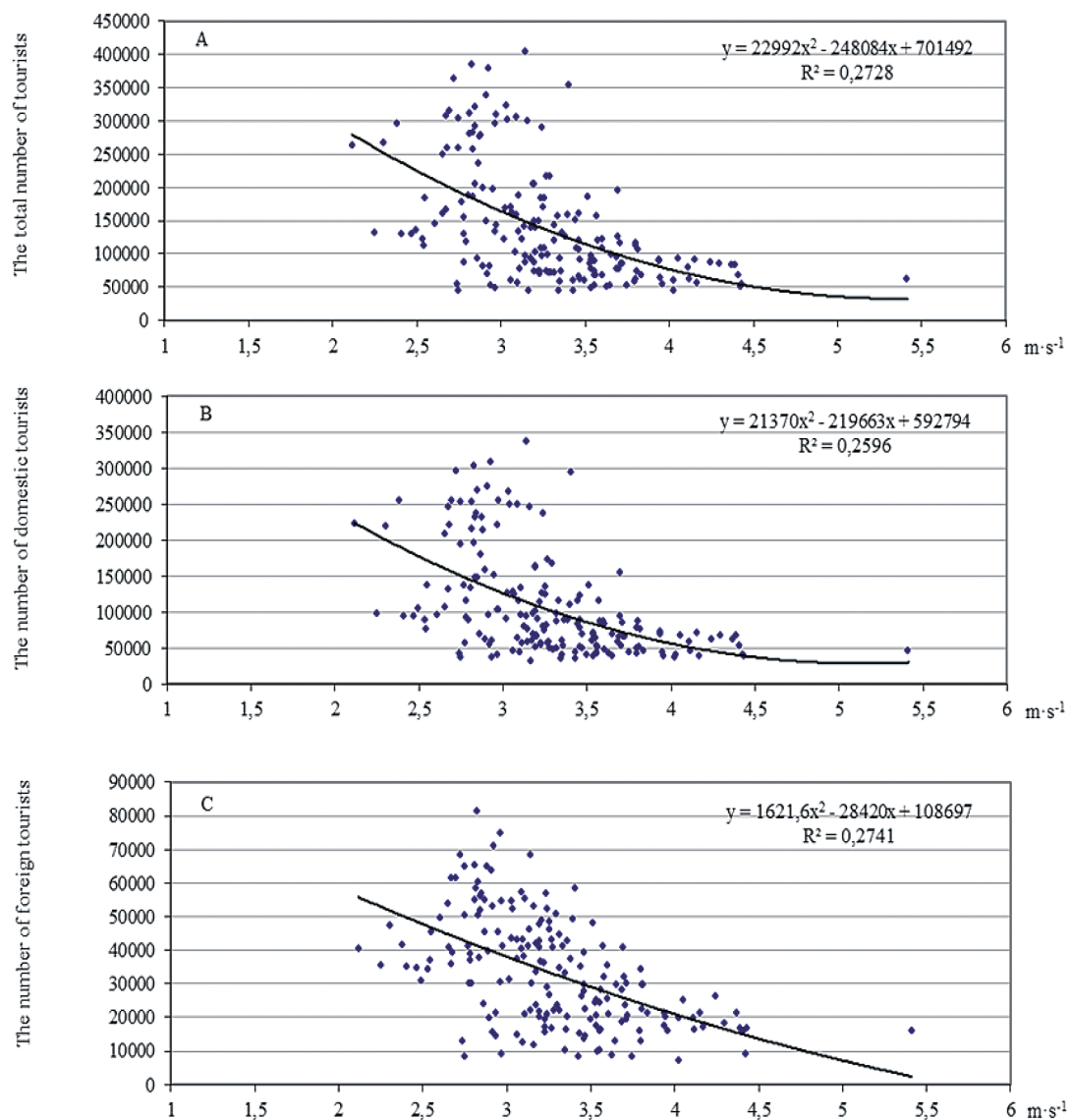


Fig. 7. Distribution of the total number of tourists (A), domestic tourists (B) and foreign tourists (C) against monthly wind speed in Zachodniopomorskie Voivodeship: 2000–14

Source: Authors

The dependence of the number of tourists on the number of days with precipitation proved to be statistically insignificant, thus this meteorological factor has been disregarded in the present paper.

4. Conclusions

Climatic conditions in Poland have a considerable effect on underlying natural seasonality and varia-

bility of tourist flows. An increase in air temperature results in an increase in the number of tourists, especially individual tourists. The number of tourists decreases along with a decrease in temperature, and an increase in cloudiness and wind speed.

The number of tourists in Zachodniopomorskie Voivodeship in the analysed period, 2000–14, shows a highly statistically significant positive trend, especially in the autumn and winter months, which contributes to a decrease in the uneven distribution of tourist flows throughout a year.

The seasonal nature of tourist flows is particularly evident in the number of overnight stays. The ratio of accommodation provided in summer for tourists in total to that in winter is 6.4, out of which 7.4 is for domestic tourists and 3.6 for foreign tourists. The ratio of overnight stays provided for both domestic as well as foreign tourists in autumn to that of summer is 1.1.

The ever-increasing intensity of life and activities undertaken, improvements in the hotel and spa infrastructure as well as accessibility in terms of transport will make it easier for holiday makers to organise short-term breaks on coastal, lake district or national and landscape parks in the voivodeship.

Ongoing global warming and improving tourist infrastructure will foster a balanced distribution of tourists throughout a year, especially in winter and early spring.

Increasing mass tourism and deteriorating environmental conditions on the Polish Baltic coast call for immediate identification of new and attractive, yet less frequently visited, tourist areas which would attract those who want a weekend break as well as those planning to spend their entire holiday there.

References

- Bender, O., Schumacher, K.P. and Stein D.**, 2005: Measuring Seasonality in Central Europe's Tourism – How and for What? In: *CORP & Geo Multimedia 05*, pp. 303–309.
- Błażejczyk, K. and Kunert, A.**, 2011: Bioklimatyczne uwarunkowania rekreacji i turystyki w Polsce. (Bioclimatic principles of recreation and tourism in Poland – in Polish). In: *Polish Academy of Sciences. Institute of Geography and Spatial Organization. Monographies*, Vol.13, Warszawa: Instytut Geografii i Przestrzennego Zagospodarowania PAN, Monografie, 13, pp. 366.
- Bigović, M.**, 2012: The strength and dynamics of the seasonal concentration in Montenegrin Tourism. In: *Turizam*, Vol. 16(3), pp. 102–112.
- Borzyszkowski, J.**, 2014: Zjawisko sezonowości w turystyce – istota problemu i działań krajowych podmiotów polityki turystycznej na rzecz jej ograniczenia (Seasonality in tourism – the essence of the problem and the activities of national entities tourism policy to its limit – in Polish). In: *Rozprawy Naukowe Akademii Wychowania Fizycznego we Wrocławiu*, Vol. 45, pp. 167.
- Bowen, D.**, 2002: Research through Participant Observation in Tourism: A Creative Solution to The Measurement of Consumer Satisfaction/Dissatisfaction among Tourists. In: *Journal of Travel Research*, Vol. 41, pp. 4–14.
- Chabior, M.**, 2004: Warunki bioklimatyczne (Climatic conditions – in Polish). In: Koźmiński, C. and Michalska, B. editors, *Atlas zasobów i zagrożeń klimatycznych Pomorza*, Szczecin: Academy of Agriculture. Academy of Agriculture Szczecin, pp. 101.
- Goeldner, C.R. and Ritchie, J.R.B.**, 2003: *Tourism: Principles, Practices, Philosophies*, 9th edition. Chichester: Wiley.
- Głabiński, Z.**, 2015: The application of social survey methods in analysing the tourist activity of seniors. In: Szymańska, D. and Rogatka, K., *Bulletin of Geography. Socio-economic Series*, No. 27, Toruń: Nicolaus Copernicus University Press, pp. 51–65. DOI: <http://dx.doi.org/10.1515/bog-2015-0004>
- Koźłowska-Szczęśna, T., Krawczyk, B. and Kuchcik, M.**, 2004: Wpływ środowiska atmosferycznego na zdrowie i samopoczucie człowieka (The impact of atmospheric environment on the health and well-being of man – in Polish). In: *Polish Academy of Sciences, Institute of Geography and Spatial Organization, Monographies*, Vol. 4. Warszawa: Instytut Geografii i Przestrzennego Zagospodarowania PAN, Monografie, 4, pp. 194.
- Koźmiński, C., Michalska, B. and Czarnecka, M.**, 2012: Klimat województwa zachodnio-pomorskiego (Climate of Zachodniopomorskie Province – in Polish). ZAPOL Dmochowski, Sobczyk. Sp.j. West Pomeranian University of Technology in Szczecin, University of Szczecin, pp. 194.
- Koźmiński, C., Michalska, B., Szczepanowska, E., Górnik, K. and Marks, R.**, 2015: Turystyka zdrowotna, uzdrowskowa i uwarunkowania bioklimatyczne (Health tourism, spa and bioclimatic conditions – in Polish), Szczecin: University of Szczecin, pp. 250.
- Koźmiński, C. and Michalska, B.**, 2004: Atlas zasobów i zagrożeń klimatycznych Pomorza. (Atlas of climatic risk to crop cultivation in Poland – in Polish). In: Koźmiński, C. and Michalska, B. editors, *Szczecin: Academy of Agriculture*, pp. 101.

- Koźmiński, C. and Michalska, B.**, 2014: Ocena długości sezonu kąpielowego na polskim wybrzeżu Bałtyku (Assessment of the length of bathing season on the Polish Baltic Sea coast – in Polish). In: *Europa-Regionum*, T. XXIV, pp. 11–22.
- Lijewski, T., Mikułowski, B. and Wyrzykowski, J.**, 2002: Geografia turystyki Polski (Geography Tourism Polish – in Polish). Warszawa: PEW, pp. 384.
- Liszewski, S.**, 2009: Przestrzeń turystyczna Polski. Koncepcja regionalizacji turystycznej (Polish tourist space. The concept of regionalization of tourism – in Polish). In: Jażewicz I. editor, *Współczesne problemy przemian strukturalnych przestrzeni geograficznej*, Słupsk: Akademia Pomorska, pp. 59–70.
- Panasiuk, A.**, 2006: Ekonomia turystyki (Economics of tourism – in Polish). Warszawa: Państwowe Wydawnictwo Naukowe, pp. 232.
- Parry, M.L.**, 2000: Assessment of the Potential Effects and Adaptations for Climate Change in Europe: The Europe ACACIA Project. In: Parry M.L., editor, *Jackson Environment Institute*. Norwich: University of East Anglia, pp. 320.
- Pawlikowska-Piechotka, A.**, 2009: Zagospodarowanie turystyczne i rekreacyjne (Tourist and recreational development – in Polish). Gdynia: *Novae Res*.
- Parzych, K.**, 2011: Wybrane cechy ruchu turystycznego w Kołobrzegu w świetle wyników pomiarów ruchu turystycznego (Selected features of tourism in Kołobrzeg in the light of the results of measurements of tourism – in Polish). In: *Słupskie Prace Geograficzne*. Vol. 8. pp. 75–84.
- Przeclawski, K.**, 1997: Człowiek a turystyka. Zarys socjologii turystyki (Man and tourism. Outline of sociology of tourism – in Polish). Kraków: Albis, pp. 160.
- Starkel, L. and Kundzewicz, Z.**, 2008: Konsekwencje zmian klimatu dla zagospodarowania przestrzennego kraju (The consequences of climate change for development surround the country – in Polish). In: *Nauka1*, pp. 85–101.
- Starkel, L.**, 2003: Extreme meteorological events and their role in environmental changes. the economy and history. In: *Global Change*, Vol. 10. pp. 7–13.
- Stasiak, A.**, 2011: Uwarunkowania i bariery rozwoju turystyki społecznej w Polsce. (Determinants and barriers to the development of social tourism in Poland – in Polish). In: Stasiak, A. editor: *Perspektywy i kierunki rozwoju turystyki społecznej w Polsce. Prospects and directions of development of social tourism in Poland*, Łódź: Wyższa Szkoła Turystyki i Hotelarstwa, pp. 375–395.
- Turystyka w województwie zachodniopomorskim w latach 1998–2014 (Tourism in Zachodniopomorskie Voivodeship in the years 1998–2014 – in Polish): 2015, Szczecin: Urząd Statystyczny.
- Zaręba, K.**, 2012: Zrównoważony rozwój warunkiem zabezpieczenia funkcji rekreacyjnych uzdrowisk (Sustainable development provided security functions recreational spas – in Polish). In: *Inżynieria ekologiczna*, Vol. 30, pp. 206–218.