4.6 Travel Times between BSR Cities

The indicator "Travel time between BSR cities" belongs to the group of daily accessibility indicators. It shows the travel time relationships between the main urban centres in the BSR. So, conceptually, there is a fundamental difference to the previous indicator which displays travel times to the next city, i.e. in this way also shows the service areas of the cities, whereas the indicator in this section shows the connectivity of the Baltic urban system. The indicator will display whether the current BSR transport services are in line with the spatial structure of the urban system or not.

For this indicator a map type has been developed that is based on current road, rail and air travel times between the BSR cities of more than 50,000 inhabitants; to reflect the peculiarities of the BSR urban system also university towns with less than 50,000 inhabitants are included. This indicator follows the idea developed in ESPON 1.2.1 (Mathis et al., 2005) to display travel times between cities if the travel time is below a certain threshold. Based on the network infrastructure database (see Chapter 2), a dataset was developed that contains the road, rail and air travel times between all BSR city centres, i.e. the access times to the rail and air networks were included. Two travel time thresholds were defined. First, travel times below 3 hours one way indicate a potentially very close relationship between cities, because it is relatively easy to make a journey back and forth within one day. A travel time below 5 hours one way is taken as the second threshold, because even with this longer duration of the journey, it is still possible to do a, however less convenient, roundtrip in one day.

Figures 20 to 23 show the results of this urban connectivity indicator for the three modes road, rail and air and eventually for an overlay of the three modes, i.e. the fastest mode. All four maps show remarkable features of the BSR urban system.

Figure 20 displays the connectivity of cities by road. Not surprisingly, a large number of connections below 3 hours are to be found where the density of cities is higher, i.e. mainly in Poland and the BSR areas in Germany. But whereas Poland displays an urban system more evenly distributed over the territory leading to a narrow mesh of potential connections, this part of Germany is dominated by the two cities of Berlin and Hamburg. North-eastern Poland, Lithuania, Latvia and Belarus show a regular pattern of connections in a less dense urban system, however, because of the road quality, the travel times are more often in the range of three to five hours. Denmark and the southern areas of Sweden and Finland have also less dense urban networks, but travel times are more often below three hours. Connected urban system in Norway are only in the Oslo area, the same is true for the Russian parts of the BSR in which road connected urban systems are only visible in the St. Petersburg area. Estonia has only very few cities in the category defined which are connected by travel times of up to five hours.

Figure 21 shows the rail connectivity of cities. At a first view, the map looks very similar to the one for road. However, there are important differences. In many parts of the BSR including Poland, eastern Germany, Lithuania and Belarus there a substantial less connections between cities with travel times below three hours. On the other hand, in Sweden and Finland the number of connections with less than three hours travel time is higher than for road.

Figure 22 shows air connectivity of the BSR cities. The picture is completely different from the two previous ones: Whereas they show spatial structures of connectivity structures dominated by regional urban systems; now, air connectivity is dominated by larger distances within the travel time thresholds. However, the emerging urban relationships are primarily nationally dominated, in particular in the Nordic countries and in Poland. With few exceptions, only the capitals plus St. Petersburg, Hamburg and Gothenburg are offering a reasonable amount of linkages to other countries, but here again, mostly to the capitals. Thus, there are two overlapping urban spatial systems: the international network of capitals and the national star like network of the capitals and more remote smaller cities.

Figure 23 eventually shows the connectivity of the BSR urban system by all modes, i.e. if one mode offers travel times below the thresholds the corresponding line is drawn on the map. The emerging pattern is the sum of the individual modal patterns. The overlay results in a C-shaped arc of fairly good connected cities starting in St. Petersburg and going via Helsinki, Stockholm, Copenhagen, Hamburg and Berlin to Warszawa. Two specific characteristic are visible. First, the eastern parts of the BSR comprising the Baltic States, Belarus and parts of the Russian BSR area show relatively low densities of connecting potential based on both, less cities and less high-quality transport connections. Secondly, the Baltic Sea as such is still visible as an important barrier to travel in this part of Europe; only very few connections across it show travel times of less than three hours. However, there are numerous connections with travel times of less than five hours across this natural barrier.

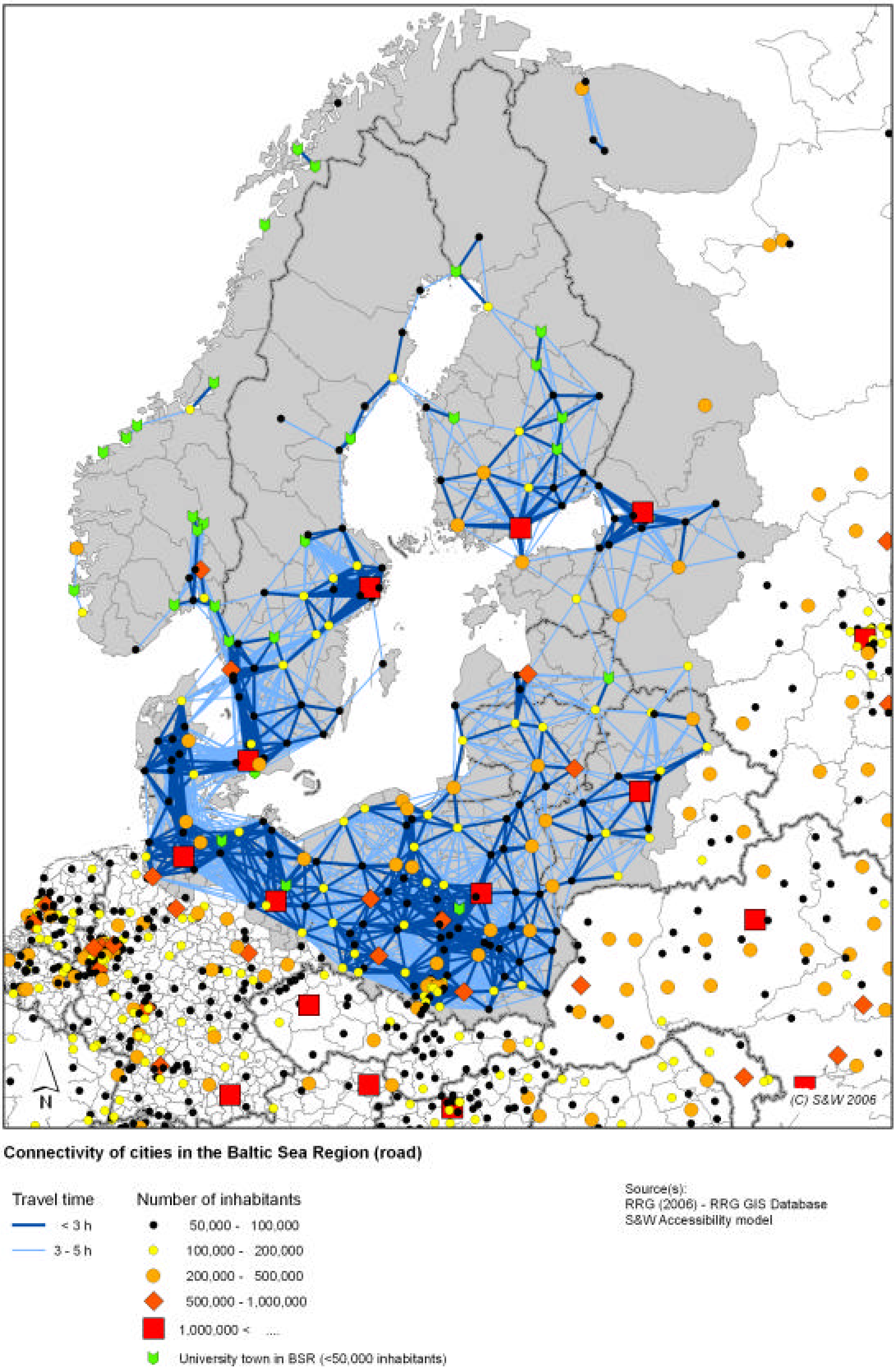

Figure 20. Road connectivity of BSR urban network.

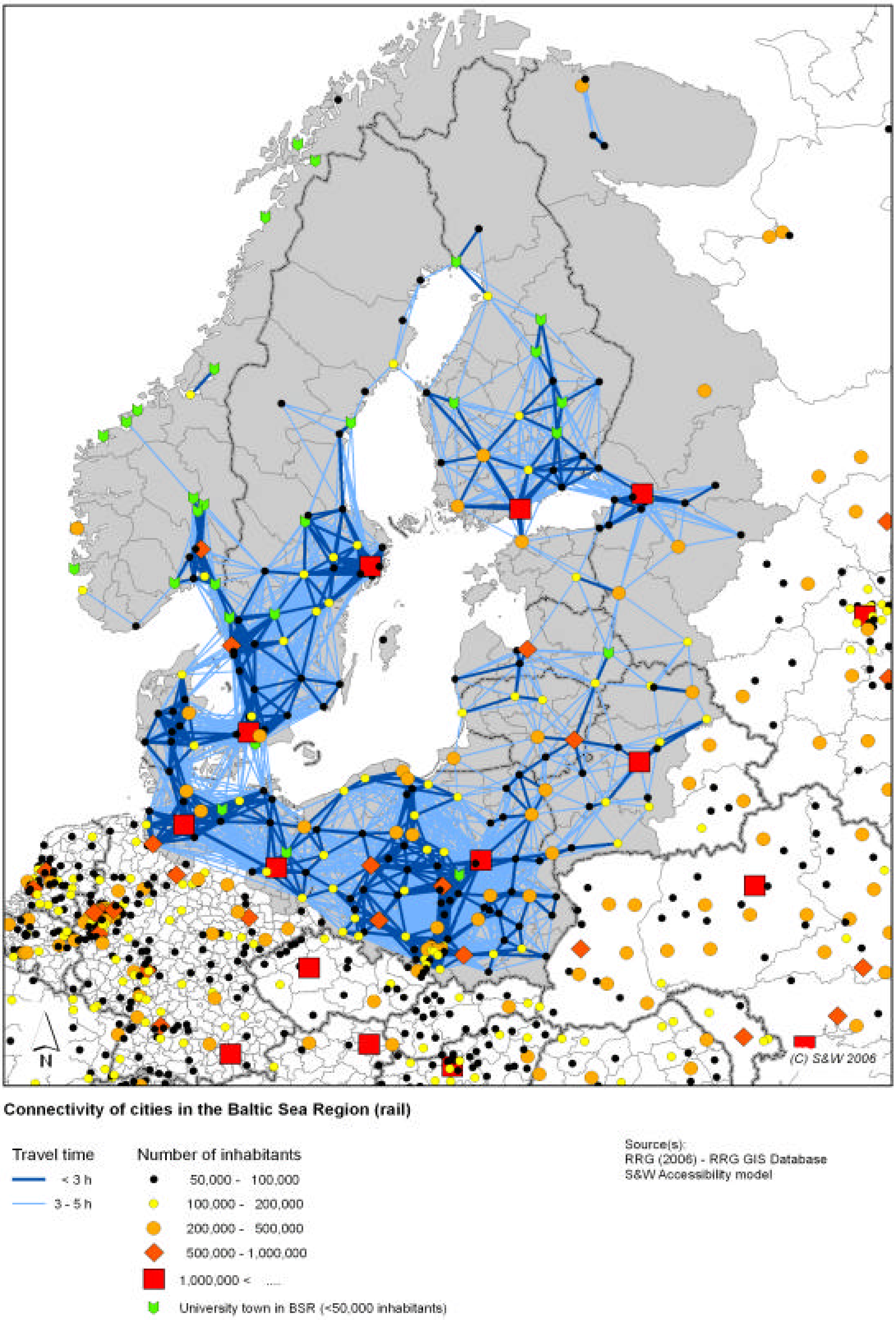

Figure 21. Rail connectivity of BSR urban network.

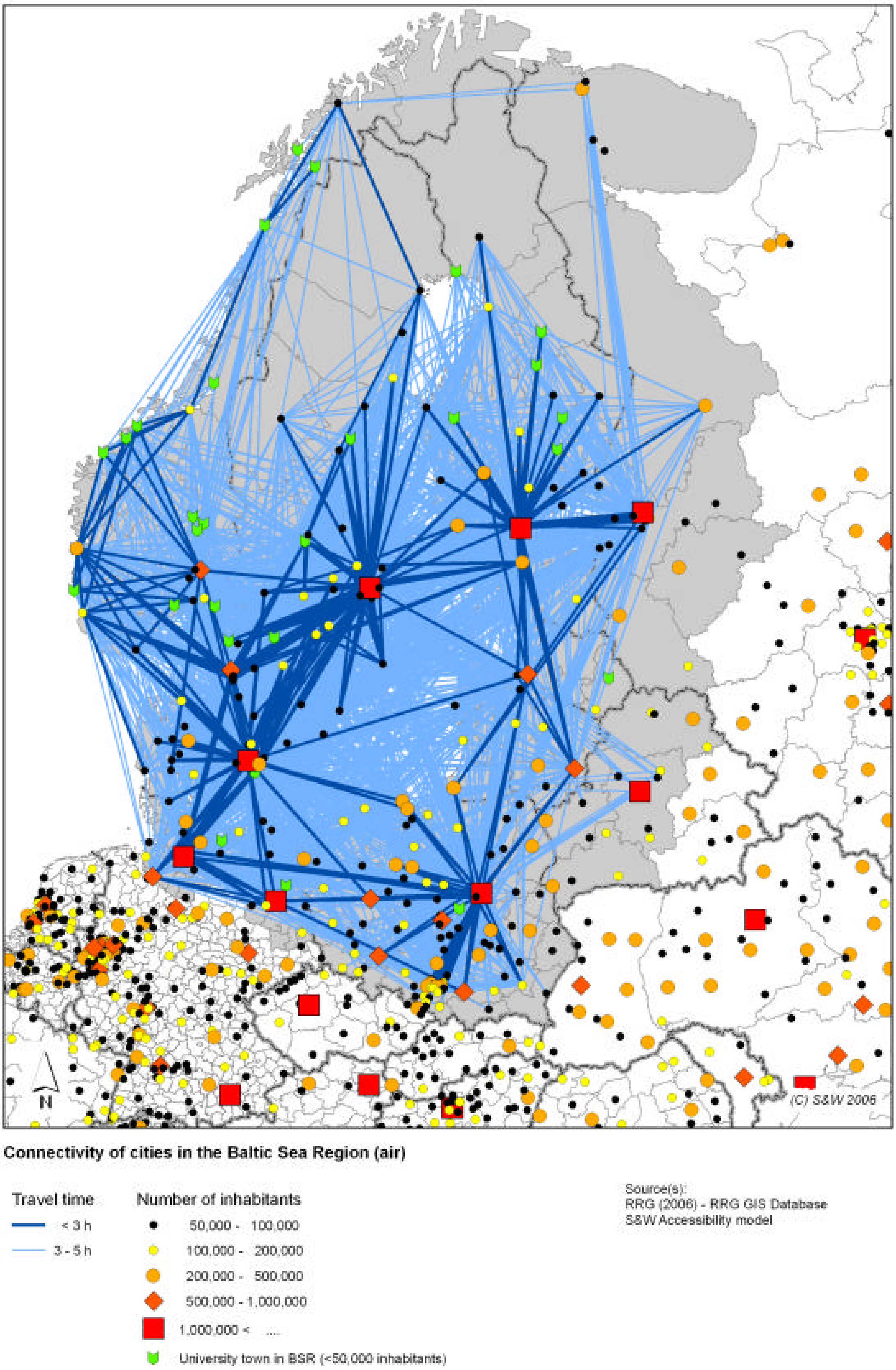

Figure 22. Air connectivity of BSR urban network.

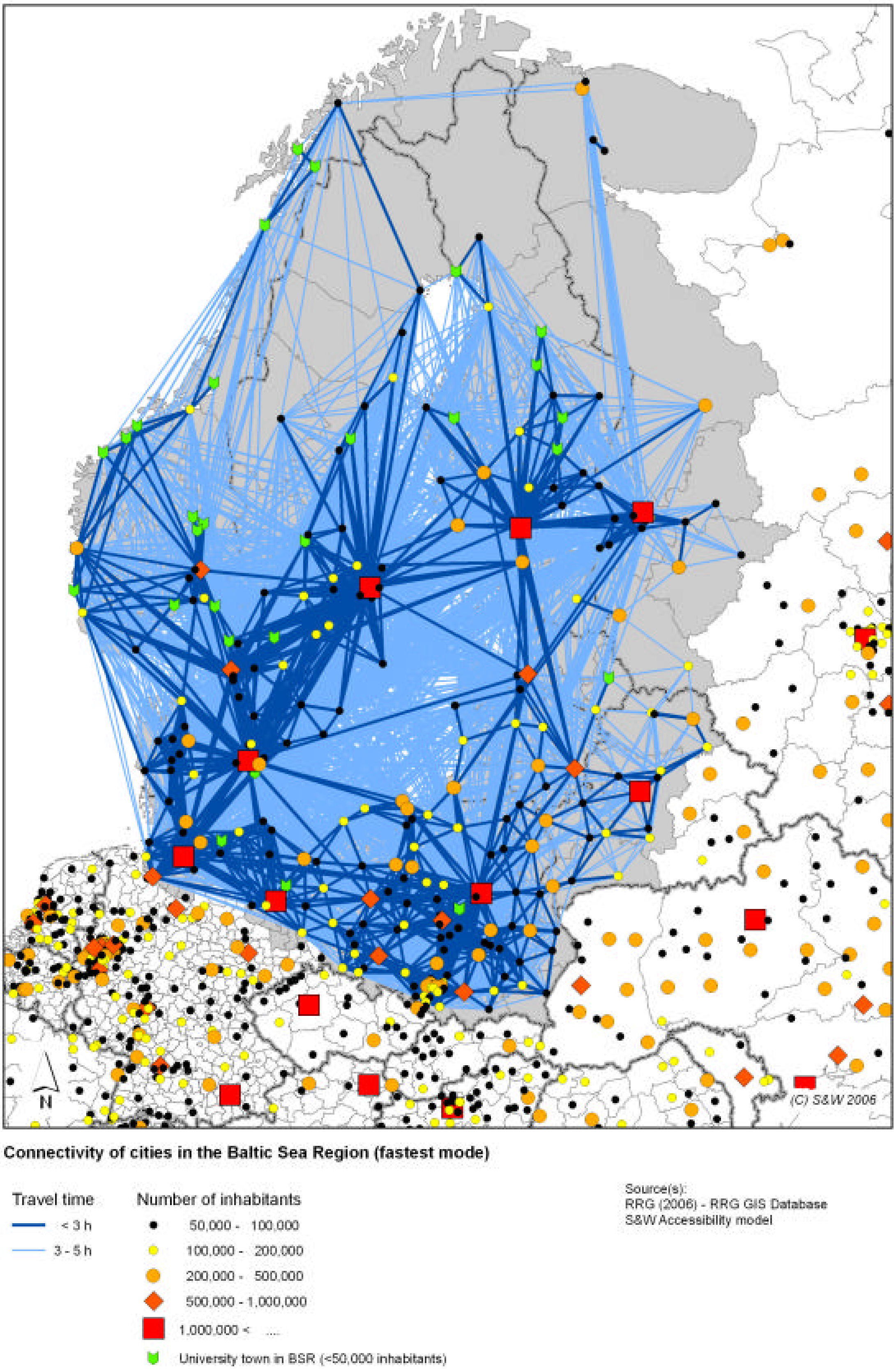

Figure 23. Fastest mode connectivity of BSR urban network.

4.7 Multimodal Potential Accessibility

The last accessibility indicator belongs to the potential accessibility type in which the attraction of a destination increases with size and declines with distance, travel time or cost. Two multimodal potential accessibility indicators were developed for this study. one uses population as destination activity as most common in accessibility studies and the other uses GDP as destination activity. Accessibility of a place following this concept is then the sum of all destination activities weighted by the travel time or cost to go there.

The two multimodal potential accessibility indicators were developed with the accessibility model specification of the ESPON 1.2.1 project (Mathis et al., 2005, Spiekermann & Wegener, 2006) of which the modal indicators reflecting the situation in the year 2001 were published in the 3rd Cohesion Report (European Commission, 2004c). Multimodal means that road, rail and air travel times between regions are aggregated and used in one combined indicator. For this study, the network database was updated to the year 2006. This includes the construction of new roads and motorways, current rail and air time table information and also the integration of several regional airports served by low-cost airlines. The population and GDP database was updated as well to the most recent year for which data is available.

Figures 24 to 26 show the current potential accessibility by using population as the destination activity of interest. Figure 24 illustrates the spatial distribution of high and low accessibility by using the population of all European regions as destinations. The indicator values mapped are standardised to the population-weighted average of the BSR. Regions with highest accessibility values in Europe are to be found outside the BSR in western parts of Germany and the Benelux country. However, the regions of Hamburg, Berlin, Copenhagen/Malmö and Warszawa including their hinterland mark visible peaks of accessibility in the BSR. Capital regions of other BSR countries do have clearly above BSR average accessibility, however, values are much lower than the more central located capital regions and are in the range of the more rural regions in Germany. In most countries, accessibility clearly goes down when moving away from the capital cities. Regions in Russia have lowest accessibility followed by the regions of the Northern periphery.

Figure 25 shows multimodal potential accessibility in which only the BSR area is considered to be of interest, i.e. the population of outside regions is neglected. Thus, the map shows which European regions have good access to the BSR market. The overall spatial pattern of accessibility within the BSR is very similar to the European-wide accessibility, but the disparities are less pronounced because the focus is less on pan-European relationships. However, also regions outside the BSR have fairly good accessibility to the BSR which is partly higher than in several BSR regions; this means that the BSR market could also be easily served from outside the area.

Figure 26 relates the two previous maps by showing which contribution the accessibility to the BSR makes to the European accessibility of the regions. Highest shares are of course located in BSR regions, but there is a distinct spatial pattern. The northern and western accessibility values are only to a low degree constituted by BSR destinations, i.e. the orientation of those regions can be much more easily directed outwards the BSR. For the eastern areas of the BSR, the BSR is important. This is particular true for two types of regions. The first one consist of rural regions; here, without good international connections, the relatively low accessibility is mainly based on national destinations. The second type consists of regions with a large number of inhabitants such as the regions around St. Petersburg and Brest. Here, the huge self-potential with a lack of sufficient international connections leads to very high degrees of dependencies of the accessibility indicator values on the local and regional destinations. Outside the BSR the BSR is hardly important for the accessibility potential; outside the European territory shown on the map the contribution of the BSR to the accessibility potential of the regions is clearly below ten percent.

A similar series of multimodal potential accessibility maps is presented in Figures 27 to 29; for these maps the destination activity is GDP. Comparing the map with all European GDP as destination activity (Figure 27) with the corresponding map for population (Figure 24), a rather similar pattern of high and low accessibility within the BSR area is visible. However, there are some slight shifts of regions in both directions compared to the BSR average; towards higher accessibilities in the Nordic countries and in Germany and towards lower accessibility in the eastern BSR. However, the most significant difference is that the BSR falls behind the clearly increased accessibility in western Europe. Here, the combined effect of good economic performance and good infrastructure and transport services lead to very pronounced increase in accessibility potential based on GDP and thus to an increased gap in accessibility to the BSR.

The pattern of Figure 28 is even more pronounced when looking at accessibility to BSR GDP only. Now, the Nordic countries and Germany are clearly visible as areas of high accessibility potential. Most of non-BSR regions in Germany and other European countries have higher accessibility to BSR GDP than regions located in the eastern BSR. On the other hand, the GDP of the BSR contributes in general to a much lesser degree to the accessibility potential of the BSR regions than shown for population (Figure 29); this is particular true for the eastern parts of the area which still have the obstacles of relatively low economic performance and transport infrastructure and services.

Table 9 gives aggregates of accessibility by country and confirms at this level of aggregation that disparities in accessibility are larger when looking at all European destinations compared to BSR destinations only and that disparities in potential accessibility to GDP are much larger compared to using population as destination activity.

Applying the concept of multimodal potential accessibility to the BSR with data for 2006 does not lead to a very distinct picture from that presented in earlier studies. The changes in the road and rail infrastructure of the last couple of years were to small to dramatically change the spatial pattern of accessibility. However, the intensified use of regional airports and the large expansion of the low-cost carrier and their flight services have changed the position of several individual regions. The replacement of population by GDP as destination activity leads to much higher disparities in accessibility in the BSR, because then the countries with lower GDP which mostly have already a lower quality of the transport infrastructure are downgraded in terms of accessibility.

Table 9. Multimodal potential accessibility

Country	Destination activity			
	European population	BSR population	European GDP	BSR GDP
Belarus *	44	52	34	30
Denmark	128	105	150	164
Estonia	66	69	68	78
Finland	87	84	92	111
Germany *	169	131	194	183
Latvia	88	84	88	86
Lithuania	73	75	73	70
Norway	77	60	92	95
Poland	96	105	87	80
Russia *	80	110	60	68
Sweden	100	87	117	134
BSR area	*100*	*100*	*100*	*100*

** only those parts of the countries considered which are eligible under BSR Programme*

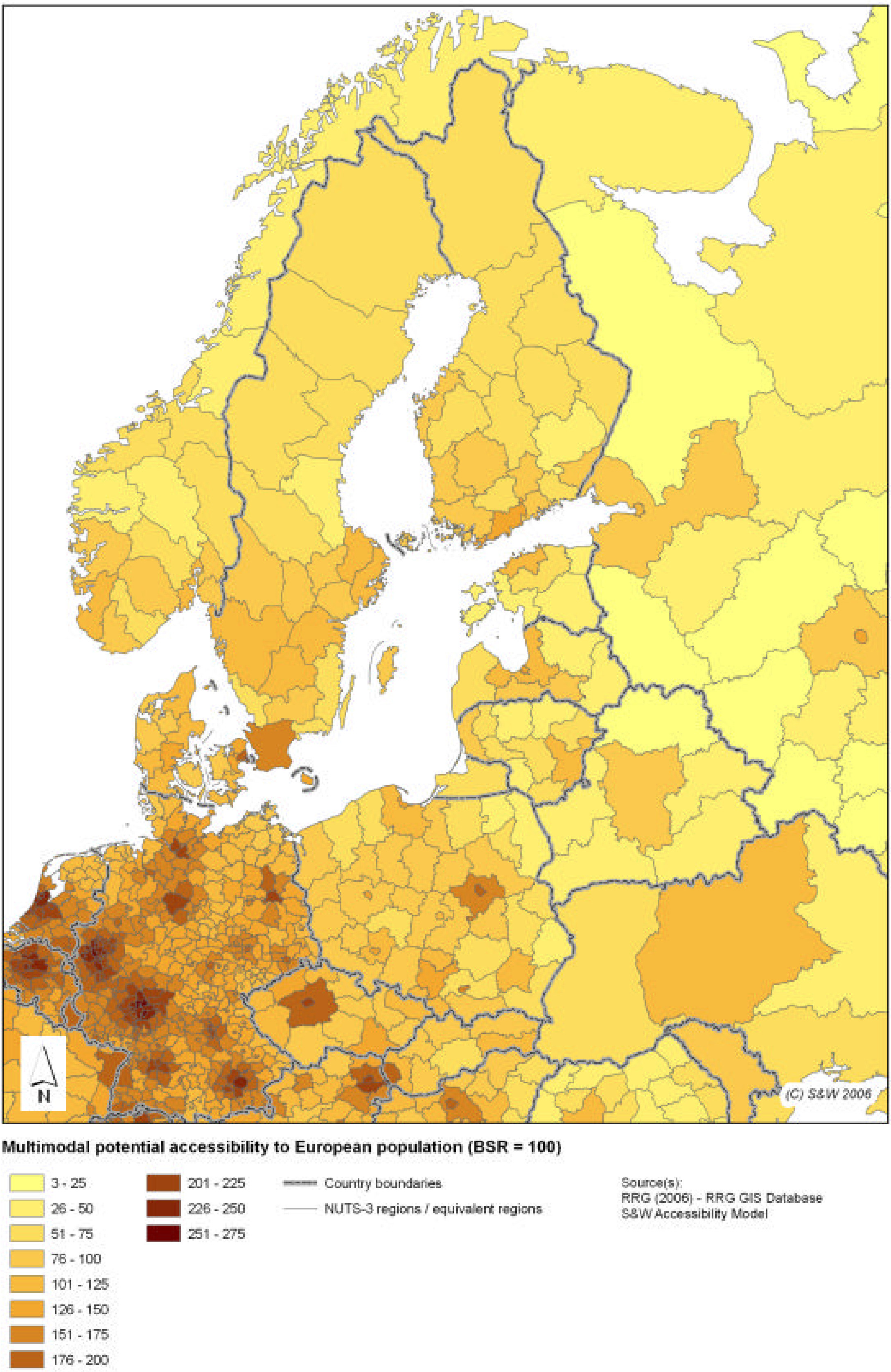

Figure 24. Multimodal potential accessibility to European population.

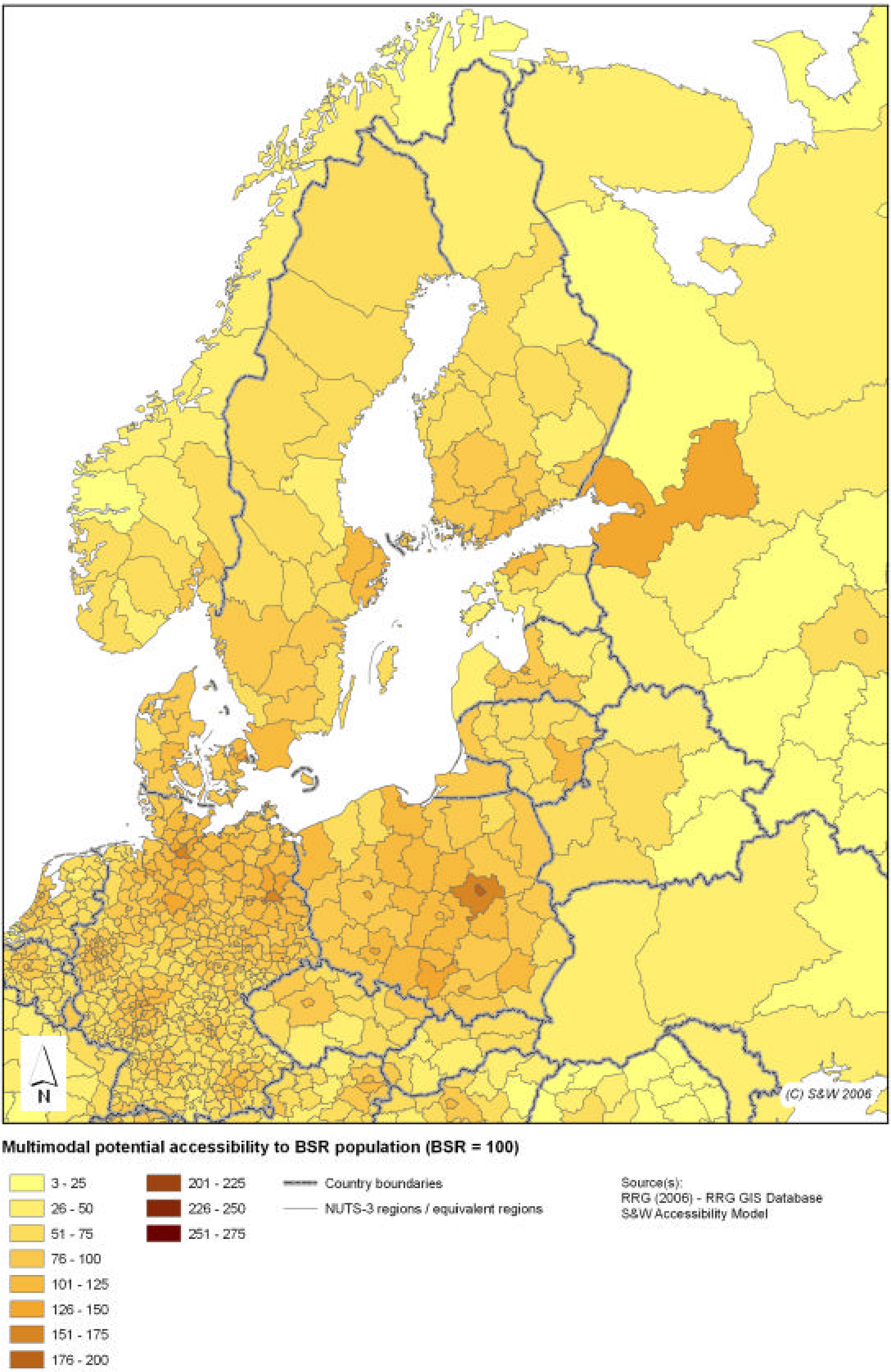

Figure 25. Multimodal potential accessibility to BSR population.

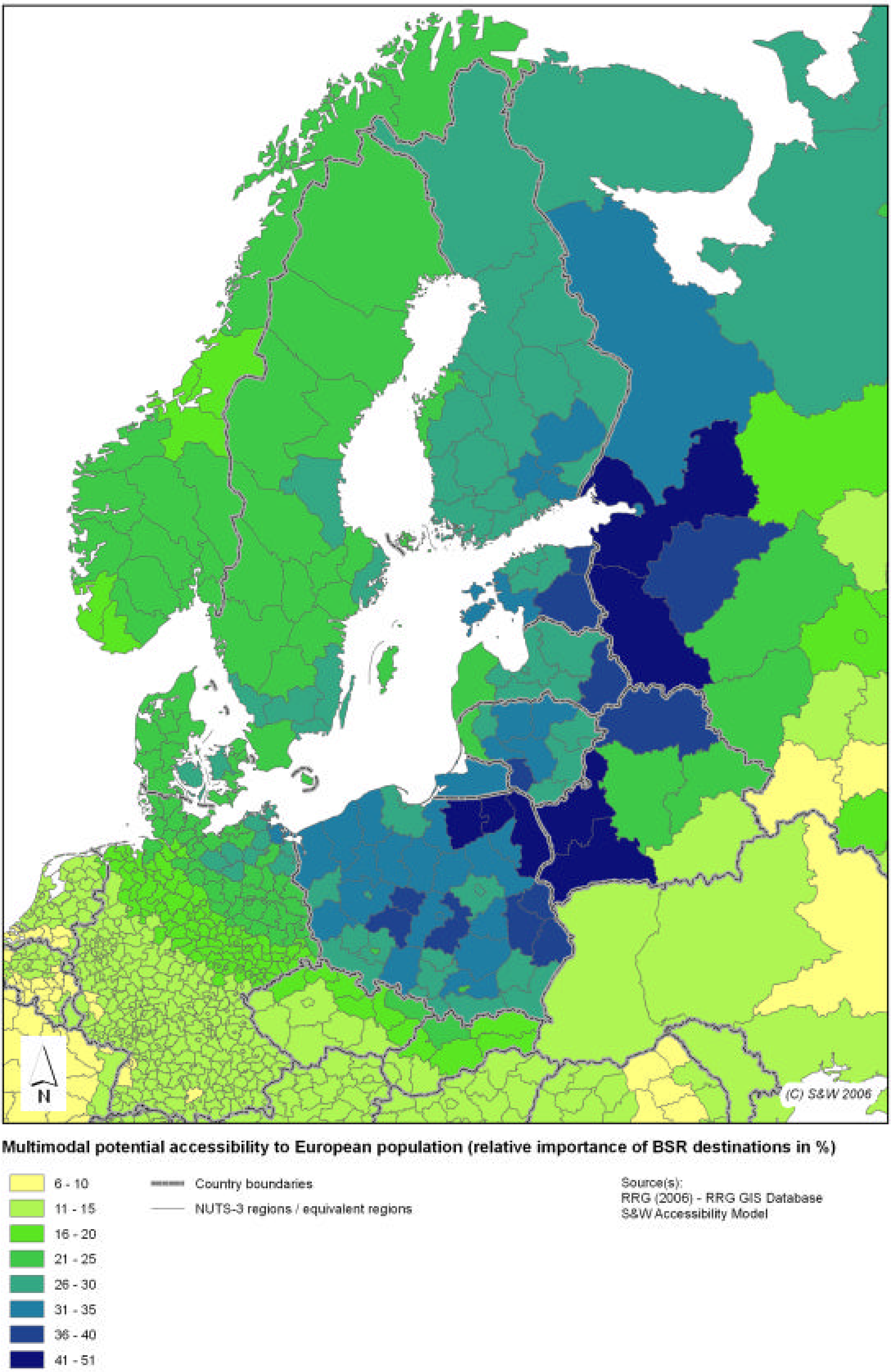

Figure 26. Contribution of BSR destinations to European accessibility (population).

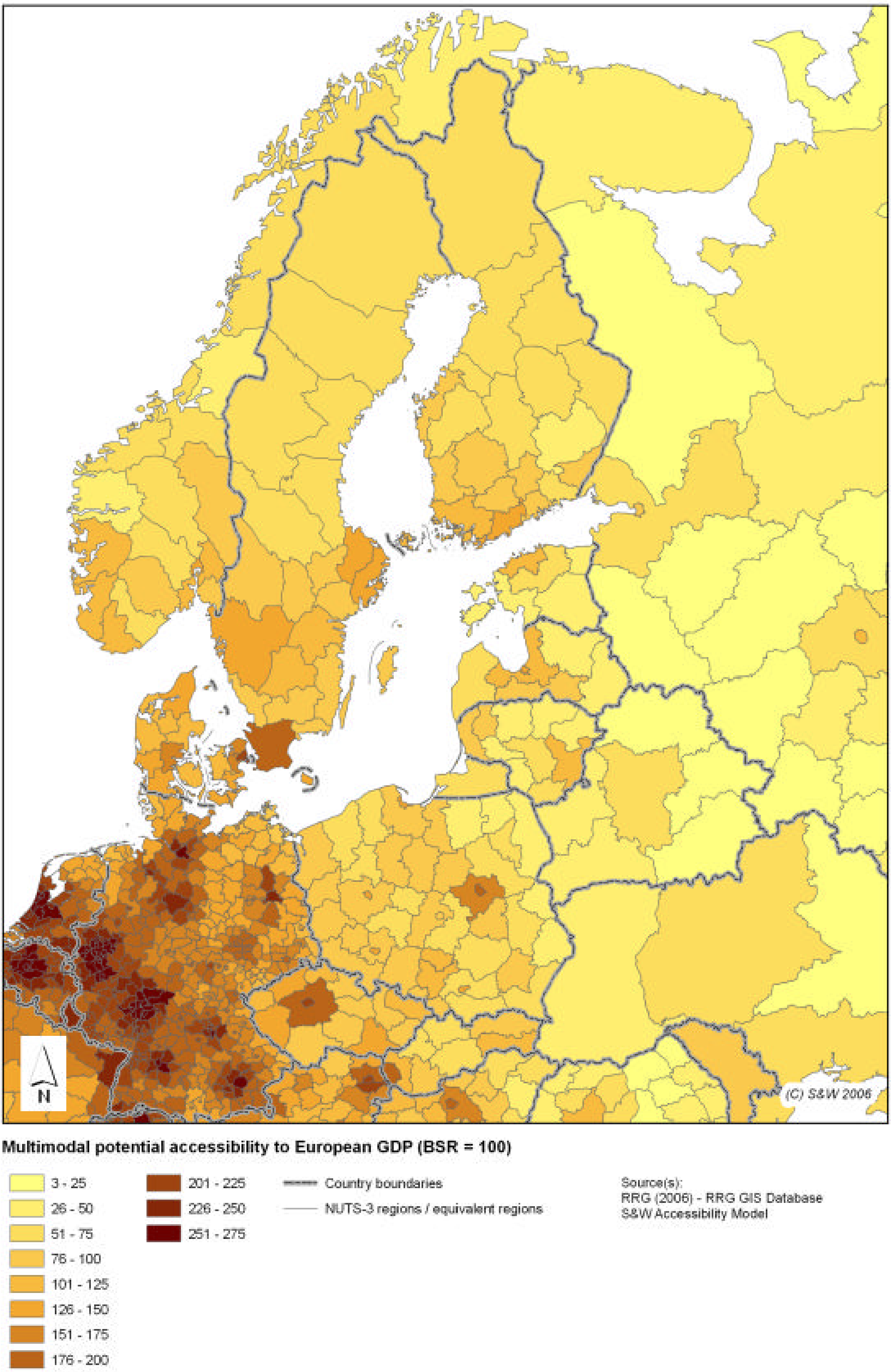

Figure 27. Multimodal potential accessibility to European GDP.

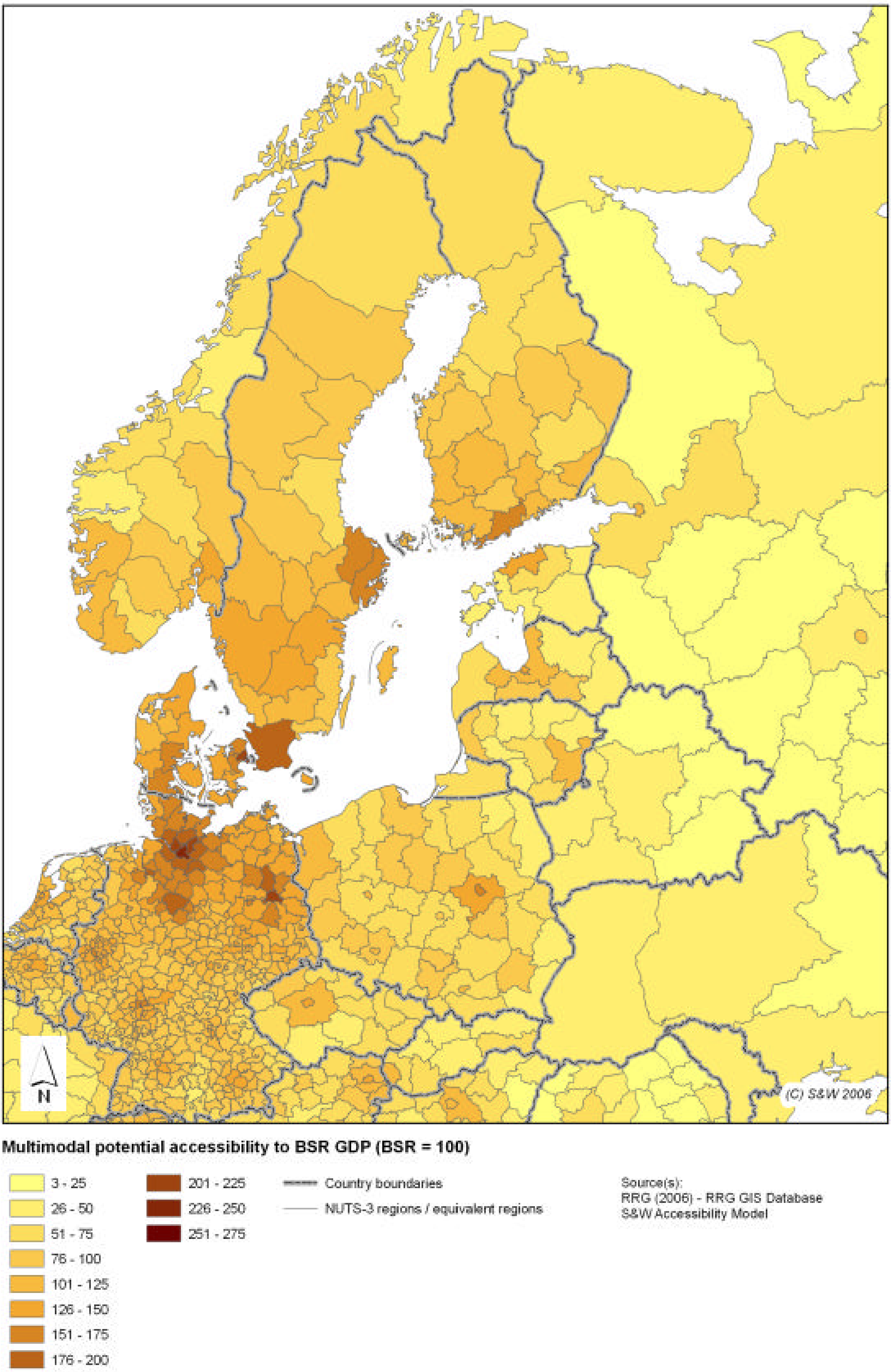

Figure 28. Multimodal potential accessibility to BSR GDP.

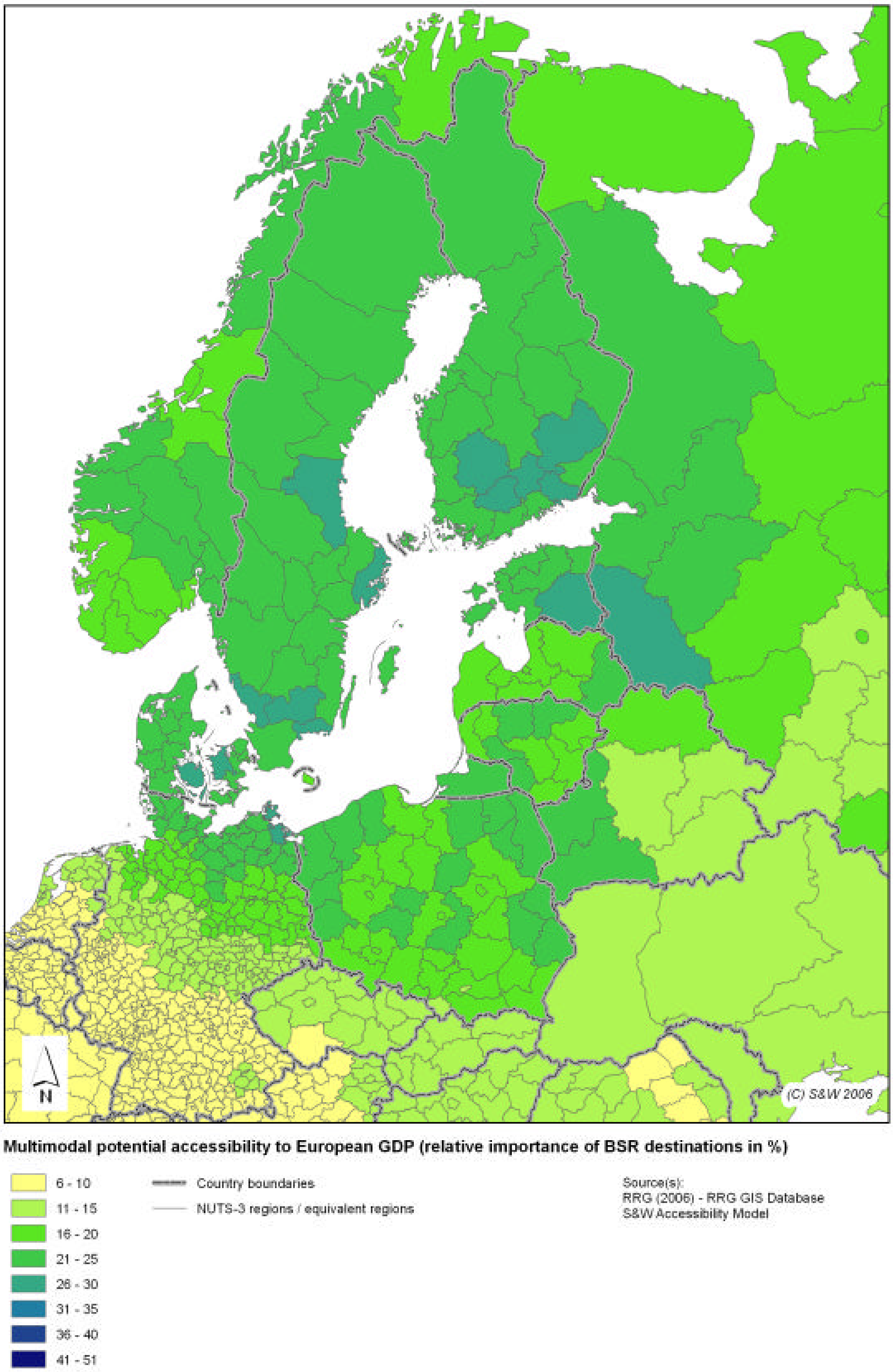

Figure 29. Contribution of BSR destinations to European accessibility (GDP).

5 Conclusions

The analysis of current accessibility pattern in the BSR provided in this report allows to assess the potentials and obstacles of the BSR in the light of different indicators, allows to see internal differentiations and disparities including those between urban and rural areas, and allows to compare the accessibility of the BSR with other parts of Europe. Finally, the interpretation of the results allows to draw some conclusions concerning policy measures such as the allocation of programme resources and subsequent investments.

Transport infrastructure endowment

Already the presentation of the transport infrastructure networks in Chapter 3 has shown the huge disparities in infrastructure endowment and transport services in the BSR. In general, road and rail networks are much more developed in the western parts of the BSR compared to the eastern areas but also compared to the northern periphery. Motorways and modern railways prevail in Germany, Denmark, southern Sweden and parts of Poland. Airports offering highest numbers of destinations are located at the national capitals of the Nordic countries, Germany and Poland and in St. Petersburg. However, in several of those countries there are additional airports serving up to fifty destinations, figures that are also reached nowadays by the capital airports of the Baltic States. Intermodal transport terminals are mostly located at the Baltic Sea or at main railway corridors in the western part of the BSR.

Accordingly, access times to those infrastructure facilities differ clearly between the different parts of the BSR. Countries with lower transport infrastructure endowment do face longer access times to rail stations, airports or intermodal terminals. Highest access times are often to be found in the Russian part of the BSR and in Belarus followed by the Baltic States, this is particular true for freight transport. However, in the Nordic countries access time to rail are often very high. On the other hand, those countries do have fairly good access time to airports which are partly much shorter than in more densely populated countries. This is a direct consequence of the systems of regional airports in those countries with feeder service to the national capitals.

ICT endowment

The way towards an information society in the BSR was reflected with indicators on mobile phone penetration and broadband access to the internet. It could be shown that nowadays on average almost every person owns a mobile telephone and that the saturation level of this equipment seems to be reached already. The few exceptions from this can be considered as being of temporal nature; it can be expected that the gap to the other countries will be closed in the very near future.

The picture on broadband access to the internet at home is very different. First, the availability to households is even in advanced countries much below fifty percent which is probably still far away from demand. Nevertheless, there are spatial disparities in the diffusion of this technology visible in two respects, between countries and within all types of countries between urban and rural regions.

Access to next larger city

The access times from the territory to the next larger city are primarily determined by the spatial distribution of cities in the BSR. Consequently, countries with higher densities of medium-sized and large cities have lower average travel times to reach the city centres. This is supported by the analysis showing Germany, Poland and Denmark with reasonable short access times and the northern countries and Russia with highest average travel times to cities.

Connectivity of urban system

The degree of connectivity of the BSR urban system has been analysed on the basis of travel times by road, rail and air transport between all cities of the area. Based on road and rail transport, the connected urban system is in most countries very nationally oriented showing higher degrees of connectivity in countries with higher densities of cities and modern transport infrastructure. Comparing rail with road connectivity it is remarkable that the urban systems in the Nordic countries are better served by rail whereas in the eastern parts of the BSR at generally lower levels of connectivity road is providing better connectivity for the cities. Looking at air connectivity, larger distances between cities can be overcome in the given travel times. But nevertheless, the connected urban system is to a high degree dominated by national linkages which are then overlaid by a system of well connected capital cities. Looking at the three modes together, the urban system is well connected along the Baltic Sea coast in an arc stretching from St. Petersburg via Helsinki, Stockholm, Copenhagen, Hamburg, Berlin to Warszawa; thus leaving an area of less connected cities in the Baltic states and Belarus and beyond and still seeing the Baltic Sea as a barrier to travel between cities of the BSR.

Potential accessibility

The potential accessibility indicator is theoretically most secured as it is based on human behaviour with respect to spatial interaction. The indicator expresses the degree of opportunities a location might have from the existence of transport infrastructure and services connecting to the activities or facilities of interest.

The analysis of multimodal potential accessibility has shown the large disparities existing in the BSR. The German parts of the BSR and Denmark, parts of Poland and Sweden have highest accessibility to population; looking at GDP Poland falls back. The Baltic States, Belarus, Russia and the northern peripheral areas have lowest accessibility within the BSR and thus also within Europe as a whole. Disparities are much higher when looking at GDP based accessibility, the east-west divide becomes much more pronounced and in particular the gap to other European regions is increasing.

Considering only the BSR area as destination of interest, the spatial pattern remains similar for population based accessibility and disparities within the BSR are somewhat lower. Looking only at the accessibility based on GDP generated in the BSR disparities are higher than for population. The contribution of the BSR destinations to the European accessibility differs between GDP and population. For GDP the contribution of the BSR destinations is much lower, i.e. the accessibility potential is much more depending on connections to regions outside the BSR. For population the share is higher and the disparities are larger. In particular there are regions in the eastern part of the BSR, rural as well as huge agglomerations, which are very much dependent on the contribution of the BSR destinations.

Need for intervention at the transnational Baltic Sea Region level

The analysis has shown that the BSR is characterised by huge disparities in accessibility: parts of the regions are almost at European peak values for certain indicators, parts of the region are about European average and several parts, in particular in the northern and eastern areas belong to the most lagging areas of Europe in terms of transport infrastructure endowment and accessibility. It has also been shown that the connectivity provided by the transport system is to a large degree very nationally oriented, thus lacking transnational components which are important for the integration of the BSR. This clearly marks important deficits in competitiveness and territorial cohesion of the BSR.

The main strategic objective of the BSR Interreg Programme under preparation is "to strengthen competitiveness of the Baltic Sea Region, its territorial cohesion and sustainability of its development by connecting potentials over the administrative borders" (BSR JPC, 2006, 15). Seen in the light of the results of this study, all major elements of the strategic objective, competitiveness, territorial cohesion and sustainability, call for interventions in the field of accessibility related policy measures; the major strategy stated, connecting potentials, directly calls for the improvement of linkages within the BSR and with areas outside.

Consequently, the planned priority of the programme, "Improving External and Internal Accessibility," is of crucial importance for the success of the transnational strategy as a whole. There are two major directions of support planned in the draft programme. The first is to directly enhance through transport and ICT measures accessibility and socio-economic growth. The second direction of support is to relate transport and ICT related measures with the development of existing of the creation of new strategic development zones. The first direction of measures is directly backed-up by the findings of this study. The second direction of measures was not in the focus of this study, but it reflects the important linkage of transport related measures with spatial development measures.

6. References

Binnenschiffahrts-Verlag (1995): *Mitteleuropäische Wasserstraßen.* Duisburg: Verein für europäische Binnenschiffahrt und Wasserstraßen e.V.

Binnenschiffahrts-Verlag (1997): *Weska 1997. Westeuropäischer Schiffahrts- und Hafenkalender.* Duisburg: Verein für europäische Binnenschiffahrt und Wasserstraßen e.V.

BSR JPC – Baltic Sea Region Joint Programming Committee (2006): *Baltic Sea Region Interreg Programme 2007-2013. Transnational Territorial Co-operation Programme Around the Baltic Sea.* First draft of the programme document. 19 June 2006.

DUSS – Deutsche Umschlaggesellschaft Schiene-Straße (2006): *DUSS Terminals*. http://www.duss-terminal.de/TISWeb.Dll?LieferInfoSeite(THEMA||NAVIGATION?INDEX||HTML_INDEX). Bodenheim: DUSS.

ESPON 1.2.3 (2006): *Identification of Spatially 'Relevant Aspects of the Information Society.* Draft Final Report. Luxembourg: ESPON Coordination UNIT.

European Commission (1995): *Transeuropäisches Verkehrsnetz. Fakten und Zahlen*. Luxembourg: Office for Official Publications of the European Communities.

European Commission (1998): *Trans-European Transportation Network. Report on the Implementation of the Guidelines. Basic Data on the Networks.* Report to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions on the implementation of the guidelines for the development of the trans-European transport network (Decision 1692/96/EC).

European Commission (1999): *14 TEN Priority Projects.* http://europa.eu.int/en/comm/dg07/tentpp9807/index.htm.

European Commission (2002a): *Revision of the Trans-European Transport Networks "TEN-T". Community Guidelines.* http://europa.eu.int/comm/transport/themes/network/english/ten-t-en.html. 02-04-2002. Brussels: European Commission.

European Commission (2002b): *Trans-European Transport Network. TEN-T priority projects.* Luxembourg: Office for Official Publications of the European Communities.

European Commission (2003): *Vorschlag für eine Entscheidung des Europäischen Parlaments und des Rates zur Änderung des geänderten Vorschlages für eine Entscheidung des Europäischen Parlaments und des Rates zur Änderung der Entscheidung Nr. 1692/96/EG über gemeinschaftlich Leitlinien für den Aufbau eines transeuropäischen Verkehrsnetzes.* Brussels: Commission of the European Communities.

European Commission (2004a): *A European Initiative for Growth. Investing in Networks and Knowledge for Growth and Jobs.* Final Report to the European Council. Map "Quick Start Programme". http://europa.eu.int/comm/ten/transport/revision/revision_1692_96_en.htm.

European Commission (2004b): *Trans-European Transport Network: Implementation of the Guidelines 1998-2001.* Report from the Commission to the European Parliament, the Council, the European Economic and Social Committee, and the Committee of the Regions on the

Implementation of the Guidelines for the Period 1998-2001. Luxembourg: Office for Official Publications of the European Communities.

European Commission (2004c): A New Partnership for Cohesion: Convergence – Competitiveness – Cooperation. Third Report on Economic and Social Cohesion. Luxembourg: Office for Official Publications of the European Communities.

European Commission (2005): *The Trans-European Transport Networks 'TEN-T': Maps.* http://europa.eu.int/comm/ten/transport/maps/index_en.htm. Brussels. DG TREN.

European Communities (1996): Decision No. 1692/96/CE of the European Parliament and of the Council of 23 July 1996 on the Community guidelines for the development of the trans-European transport networks. *Official Journal of the European Communities* 39, L 228, 9 September 1996, 1-104.

Eurostat (1999a): *Regions. Nomenclature of territorial units for statistics - NUTS.* Luxembourg: Office for Official Publications of the European Communities.

Eurostat (1999b): *Statistical regions in the EFTA countries and the Central European Countries (CEC).* Luxembourg: Office for Official Publications of the European Communities.

Eurostat (2004): *Regionen. Systematik der Gebietseinheiten für die Statistik. NUTS – 2003*. Luxembourg: Office for Official Publications of the European Communities.

Eurostat (2005): The digital divide in Europe. *Statistics in Focus* 38/2005. Luxembourg: Office for Official Publicaitons of the European Communities

Eurostat (2006a): Database. General and Regional Statistics. http://epp.eurostat.ec.europa.eu

Eurostat (2006b): Database. Information Society Statistic. http://epp.eurostat.ec.europa.eu

Finnish Institute of Marine Research (2005): *Finnish Ice Service. Ice situation and sea surface temperature in various years.* http://www.fimr.fi/en/palvelut/jaapalvelu.html.

HLG - High Level Group (2003): *High-level group on the trans-European transport network. Report.* Brussels.

Mathis, P., Buguellou, J.-B., Coquio, J., Guimas, L., L'Hostis, A., Bozzani, S., Font, M., Ulied, A., Reynaud, C., Decoupigny, C., Manfredini, F., Pucci, P., Spiekermann, K., Wegener, M. (2005): *Transport Services and Networks: Territorial Trends and Basic Supply of Infrastructure for Territorial Cohesion,* ESPON 1.2.1 Final Report. Luxembourg: ESPON Coordination Unit.

OAG – Official Airline Guides (2004): *OAG Worldwide Flight Atlas*. Dec 04 – Apr 05. Bedfordshire: OAG Worldwide Limited.

OAG – Official Airline Guides (2005a): *Air Route Information. Direct Destination from/to and to/from.* OAG Club. www.oag.com. Bedfordshire: OAG Worldwide Limited.

OAG – Official Airline Guides (2005b): *OAG Worldwide Flight Atlas*. May 05 – Nov 05. Bedfordshire: OAG Worldwide Limited.

OAG – Official Airline Guides (2006): *Air Route Information. Direct Destination from/to and to/from.* OAG Club. www.oag.com. Bedfordshire: OAG Worldwide Limited.

OECD – Organisation for Economic Co-operation and Development (2006): *OECD Broadband Statistics, December 2005.* http://www.oecd.org/sti/ict/broadband.

Railfaneurope.net (2004): *The European Railway Server*. http://www.railfaneurope.net/

RRG – RRG Spatial Planning and Geoinformation (2006): *RRG GIS Database*. http://cgi.brrg.de/cgi-bin/database.php?language=de. Oldenburg/H.: RRG.

Richardson, R., Rutherford, J., Gillespie, A., Raybould, S., Rooke, A., Lane, A., Robson, S., de Sousa Santinha, G., de Castro, E.A., da Rosa Pires, A., Simão, R.F., Santos, C.C., Marques, M.J., Santos, R.F., Medes; D., Marques, J., Eskelinen, H., Frank, L., Hirvonen, T., Nemeth, S., Hague, C., Kirk, K. (2005): *Telecommunication Services and Networks: Territorial Trends and Basic Supply of Infrastructure for Territorial Cohesion.* ESPON 1.2.2 Final Report. Luxembourg: ESPON Coordination Unit.

Schürmann, C., Spiekermann, K., Wegener, M. (1997): *Accessibility Indicators*. Berichte aus dem Institut für Raumplanung 39. Dortmund: IRPUD

Spiekermann, K., Neubauer, J. (2002): *European Accessibility and Peripherality: Concepts, Models and Indicators.* Nordregio Working Paper 2002:9. Stockholm: Nordregio.

Spiekermann, K., Wegener, M. (2006): Accessibility and spatial development in Europe. *Scienze Regionali*, 5, 2, (forthcoming).

Thomas Cook (1981): *Thomas Cook European Timetable. Railway and Shipping Services throughout Europe*. Peterborough: Thomas Cook.

Thomas Cook (1996): *Thomas Cook European Timetable. Railway and Shipping Services throughout Europe*. Peterborough: Thomas Cook.

Törnqvist, G. (1970): *Contact Systems and Regional Development,* Lund Studies in Geography B 35. Lund: C.W.K. Gleerup

UIRR – International Union of Combined Road-Rail Transport Companies (2006): *UIRR Combined Transport Terminals.* http://www.uirr.com/. Brussels: UIRR.

Wegener, M., Eskelinnen, H., Fürst, F., Schürmann, C., Spiekermann, K. (2002): *Criteria for the Spatial Differentiation of the EU Territory: Geographical Position.* Forschungen 102.2. Bonn: Bundesamt für Bauwesen und Raumordnung.

World Bank (2006): *Information and Communications for Development 2006. Global Trends and Policies.* Washington, D.C.: The World Bank.