Mark Brisbane, Ellen Hambleton, Sheila Hamilton-Dyer and Mark Maltby

Reflections on the Ecological Setting and Environmental Impact of Medieval Settlement Expansion in Northern Russia

Introduction

This paper[1] examines the evidence for settlement expansion into the north of Russia from the late 10th to the 14th century and contrasts some of that evidence with that from Novgorod.

The study area runs from the south of Novgorod, around Lake Ilmen, northwards towards the White Sea. This is a land of rivers and lakes set in a boreal forest zone largely comprised of pine, spruce and birch, but around Lake Ilmen there is deciduous forest and land suitable for cultivation. It was into this environment that Slavic peoples came and settled, probably starting in the 6th century, first around Novgorod (the Ilmen Slavs) and then slowly expanding into the northern forest zone. Indigenous tribes existed in parts of this territory who were made up of largely Finno-Ugric peoples sometimes differentiated geographically between those around the Baltic (Finno-Scandinavians or Finno-Balts) and those who lived further to the east (Finnic groups, such as the Iugra). While it is possible to identify by name some of these indigenous people from documents written down in the 12th century and later, it is extremely difficult to identify archaeologically indigenous groups in the northern part of these lands in the 9th to 11th centuries. It is thought that the territory around Lakes Onega and Beloe was sparsely populated until about the 9th century, when Slavic peoples, or perhaps a mixture of Slavic and Finno-Baltic peoples, began moving into it.

There are some general questions worth posing, which may help to introduce wider issues involving settlement expansion into new territories. For instance, what motivates people to move into new areas? In general terms there are three prime reasons:

1) to obtain new opportunities to exploit the land economically;

2) to begin a new life in a new land where there may be fewer restrictions, less victimisation and more freedom than in the homeland;

3) to control new territory for political expansion and colonisation.

The first two are largely driven by individuals (the settlers), whereas the third may have elements of coercion, or at least direction, from the political leadership of the home territory.

It may also be worth considering the different forms that settlement may take. Settlement could be temporary (often seasonal) or permanent; its location may maintain close connections with the homeland or it may be peripheral, marginal and therefore isolated; the composition of its inhabitants may be skewed (e.g. entirely or almost entirely male, at least in early phases of pioneer settlement); and the social status of its inhabitants may be quite dissimilar to those in the settlements of the homeland. The new settlement's access to resources (furs, minerals, land) may be quite high, while its access to material culture may be quite low, because of its remoteness from other centres of production.

A key question for archaeologists, historians and others will be to consider what impacts the appearance of new settlers in remote areas had on the local, vegetation (plant communities, forests, other habitats), animals, and indigenous people.

Conversely, it is also important to consider the extent to which the ecology and the natural environment influenced expansion into new territories in the first place, either by acting as an incentive (e.g. due to the richness of resources) or as a limiting factor (e.g. due to the scarcity of, or the difficulty in accessing, resources). The extent that ecological factors limited or affected settlement almost certainly changed over time, as some resources were over-exploited and became scarce, or as areas became more accessible enabling them to have a greater input into the regional economy.

[1] Parts of this paper were originally presented at a conference held in Newfoundland, Canada in 2010 and subsequently published: Brisbane M. Baltic Beads and Beaver: Motivations for Medieval Settlement Expansion in Northwestern Russia // ed. Pope P. E. and Lewis-Simpson S. Exploring Atlantic Transitions. Woodbridge: Boydell Press, 2013. P. 15–24.

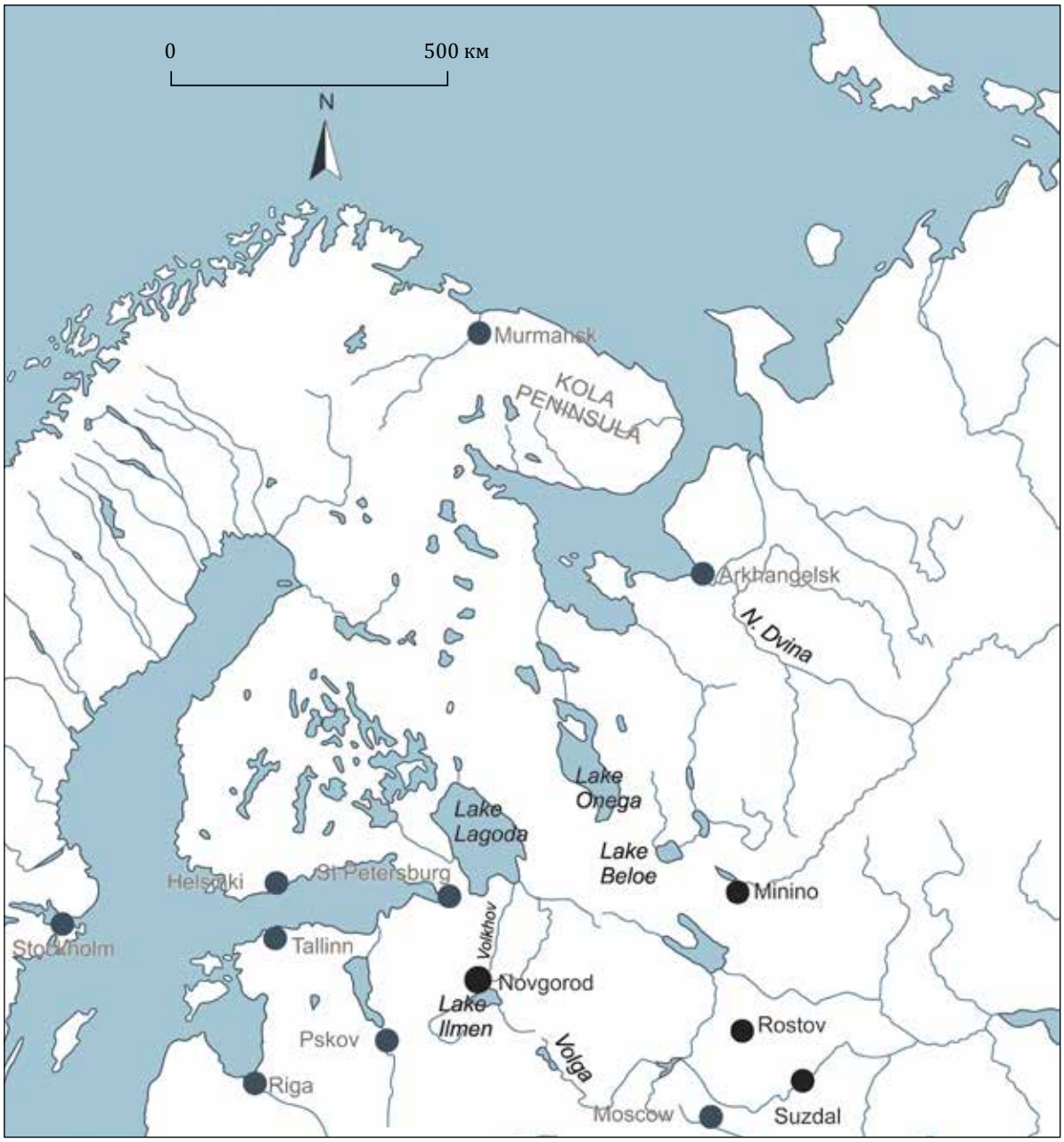

Figure 1: Map showing location of some of the sites mentioned in the text

The Colonisation of Northern lands in Medieval Russia

One of the main urban centres considered here is Novgorod (fig. 1), from where settlements expanded to the north and north-east. After Kiev, Novgorod and Rostov were the two most important regional centres in Russia in the early medieval period (from the late 10th to 13th centuries), and they were also the dominating political entities at that time. Rostov and Suzdal together with their lands (often referred to as Suzdalia) made up a separate region competing with Novgorod – an important factor in the way that the northern zone was exploited.

The territory of Novgorod is often referred to as 'Novgorod Land', suggesting it was a unified entity. However, its precise definition is somewhat enigmatic. While its name suggests a unified territory, in effect it was comprised of two rather different regions, a core inner area around Novgorod itself, under the direct control of the Novgorodians, and the more peripheral

land to the far north and east, whose inhabitants paid tribute to the city via Novgorod's tax collectors.[2] At its peak around AD 1400, the so-called Novgorod Land stretched north to the Arctic Ocean and east to the River Ob, representing an enormous area, larger than modern day France.

Documentary evidence for this period is mostly limited to a small number of chronicles, first and foremost the Primary Russian Chronicle, which, like many chronicles, provides information on princes, political intrigue, and battles won and lost. For everything else, the main evidence comes from archaeology, and foremost amongst this is the evidence from Novgorod itself.[3] Thanks to the excellent preservation of organic materials in Novgorod's anaerobic soils, we not only have a wide range of finds, but also the ephemera which permit insights into the town's links with the north. For instance, over 50 wooden cylinder seals have been found in archaeological deposits of the late 11th and 12th centuries, which tell us something of the tribute coming into Novgorod itself. These were used to seal sacks of tribute (mostly pelts) and indicated with writing and/or heraldic signs that the sack belonged to the prince, the Church (for tithes) or to the tax-collector himself, who received a specific percentage of the sums he collected. In addition, some of the cylinder seals indicated the place where the taxes had been collected. In two cases this was the area near the River Vaga, a tributary of the Northern Dvina, some 780 km to the north-east of Novgorod; another refers to a levy of furs to be collected along the River Pinega, more than 900 km from Novgorod[4].

The Novgorod excavations also led to the recovery of the famous birch-bark documents, the first of which was discovered in 1951. Since then over 1000 of these have been excavated, many of which refer to trade, exchange and tribute collection. In one birch-bark letter, a tax collector in the north writes to a certain Khoten to complain that his area of tribute collection is too large for him to cope with and he asks for someone else to be sent to help[5]. This Khoten's name also occurs on two cylinder seals.

Another wooden artefact type associated with fur collecting is the tally stick. Over 600 examples from Novgorod are known, dating from the early 10th to early 15th centuries. The accounting tallies use the method, widespread in medieval Russia, of counting pelts in units of 40, called the sorochok[6]. While the cylinder seals reflect official tribute collection, particularly in the earlier centuries, the tally sticks show the growing influence of commercial trade using middlemen based in the town. This also helps to underline the point that the collection of pelts was a central part of the Novgorod economy. In this respect, we can see the town as both a consumer of forest products and, more importantly, as a redistribution centre for these products into wider trading networks.

This urban context and Novgorod's role in the fur trade have been well known for many years[7]. What has been less well understood, and what lacked archaeological evidence, was how contemporary rural sites were organised, and the nature and sequence of settlement expansion into the north and north-east. It was often assumed that most, if not all, of these settlements were basic hunting and trapping camps, often seasonal, and with a basic level of economy. However, recent work by Makarov and his team around Lakes Beloe and Kubenskoye in the Beloozero region has challenged and changed this perception[8].

The Minino Archaeological Complex

One of the most interesting examples of this work occurs at the archaeological complex known as Minino located on Lake Kubenskoye, approximately 500 km east-northeast of Novgorod. The site has four components of medieval date, namely Minino I, II, VI and VII. Minino I is a settlement near the shore of the lake and is of late 10th– to early 13th-century date, while Minino II is its adjacent cemetery of approximately the same date. Minino VI and VII are settlements of the 12th to 15th century, located nearby, but slightly further away from the lake shore. These eventually replaced Minino I[9].

The cemetery has produced remarkable evidence of grave goods, despite the nominal introduction of Christianity into the area from the end of the 10th century, a transition which is perhaps better seen in the move away from the practice of cremation to inhumation at this time. The individuals buried here clearly represent a settled population, as there are male and female burials, adults and children. Cremations (late 10th century only) are replaced by inhumations, of which there are 63 individuals, 16 male adults, 19 female adults, 26 chil-

[2] See for example Halperin 1999 on the problems and definition of Novgorod Land.

[3] See for example papers in: Novgorod: The Archaeology of a Russian Medieval City and its Hinterland / ed. Brisbane M., Gaimster D. London: British Museum Press, 2001; The Archaeology of Medieval Novgorod in Context / ed. Brisbane M., Makarov M., Nosov E. Oxford: Oxbow Books, 2012.

[4] Yanin V. L. The wooden seals of tribute collectors // Wood Use in Medieval Novgorod / ed. Brisbane M., Hather J. Oxford: Oxbow Books, 2007. P. 203.

[5] Ibid. P. 207 (Birch Bark Document 902).

[6] Kovalev R. K. Accounting, tag and credit tallies // Wood Use in Medieval Novgorod. P. 193.

[7] For instance: Martin J. Treasure of the Land of Darkness: The Fur Trade and its Significance for Medieval Russia. Cambridge: Cambridge Univ. Press, 1986.

[8] Археология севернорусской деревни X–XIII веков: средневековые поселения и могильники на Кубенском озере: в 3 т. / отв. ред. Н. А. Макаров. М.: Наука, 2007. Т. 1: Поселения и могильники; М.: Наука, 2009. Т. 3: Палеоэкологические условия, общество и культура.

[9] Makarov N. A. The Minino Project: The investigation of a group of medieval sites in the Byeloozero region of northern Russia // The Archaeology of Medieval Novgorod in Context. P. 40–57.

dren/juveniles and two of indeterminate age and gender. This evidence, along with the size and density of the settlement itself, has led the excavators to estimate the population at Minino I was between 120 and 220 people, with the likely number of contemporary buildings being around 26 to 30, over the 250 to 300 years of the site's occupation[10].

The archaeological evidence therefore suggests that this was not a seasonally occupied settlement of male trappers. However, the animal bone evidence shows that wild, fur-bearing animals do occupy a significant element: approximately 65 % of all mammal bones identified are of wild species, of which beaver comprise 54 %, squirrel 27 %, pine marten 6.5 % and elk 6.5 %[11] The local lakes were also exploited for fish, which provided a significant part of the diet[12]. However, domestic animals comprise about 35.% of the total mammals, indicating that substantial numbers of livestock were kept at or near the site too. Over 90 % of the domestic mammal bones come from cattle, sheep/goat, and pig (36 %, 40 %, and 15 %, respectively). As discussed below, there was also abundant evidence of arable production.

The Character of the Minino Settlement and Its Environmental Impact

Further evidence for the permanency and settled nature of the Minino settlements includes the density of both houses and finds at the site, as well as extensive evidence for craft production and trade. For instance, there is abundant evidence of glass beads, metalwork, coins and trade equipment (both scales and weights). The coins are all imported and reflect contact with the Arab world in the 10th and early 11th century, but these so-called Kufic coins are largely replaced by western coins from the 11th century onwards[13].

The extent and sophistication of non-ferrous metal production at Minino is also significant. Local cast jewellery was produced. There is evidence that low grade silver, lead-bronze and copper-zinc alloys were melted in round crucibles and that tin was melted in shallow ladles with handles. Ingots of silver, brass and copper, as well as wire, were discovered in or near workshops. Domestic products included belt fittings, finger rings, and temple rings in the 11th century; zoomorphic pendants and Christian items (crosses and small icons) in the 12th and early 13th centuries[14].

Perhaps one of the most surprising aspects of these investigations is the impact that the inhabitants of Minino and the other settlements presumed to be in the area had on the local environment. This is underlined by the pollen evidence, which was studied as part of the research into Minino and its environment[15]. It showed that by the end of the 11th century/early 12th century tree pollen had dropped by 29 % from 10th-century levels. At about the same time (i. e. around AD 1100), pollen common to weeds, meadow forbs and sedges, moss and willows all increased, suggesting a rise in soil water content. In addition, the presence of cereals increased, suggesting that more land was being used for arable farming while pine replaced spruce in the woods that did survive. This adds weight to the argument put forward by palynologists that rising water levels of Lake Kubenskoye and its tributaries contributed to the abandonment of Minino I at the end of the 13th century[16]. The cereal grain evidence suggests that barley was the dominant cereal crop, providing almost 60 % of the total cereal remains found, followed by rye at about 30 %. When the environmental and archaeological evidence is considered, it appears that far from being a seasonal, single-function settlement devoted to trapping, from its inception Minino was a fully settled, permanent community where farming and agriculture, trade and exchange were as much a part of settlement life as within settlements far to the south, in the homeland area of Novgorod itself[17].

In this context, it would be interesting to speculate on the settlements' impact on the extent and character of the surrounding woodlands. While palynological studies are able to give us some ideas on this, a novel approach is currently being tried around Novgorod which may also prove useful to furthering our understanding of forest exploitation around Lake Kubenskoye. This study[18] is using environmental evidence from Novgorod and its surrounding area to model changes to forest species over the period from around AD 800 to 1500. This will be discussed further below.

[10] Археология севернорусской деревни X–XIII веков: средневековые поселения и могильники на Кубенском озере. Т. 3. С. 60–68, 221–222.

[11] These figures are based on percentages of identifiable animal bones (Number of Identified Specimens Present).

[12] Hamilton-Dyer forthcoming.

[13] Археология севернорусской деревни X–XIII веков: средневековые поселения и могильники на Кубенском озере. Т. 3. С. 220–221.

[14] Археология севернорусской деревни X–XIII веков: средневековые поселения и могильники на Кубенском озере. Т. 3. С. 79–91; Zaitseva I. E. The manufacture of jewellery in rural settlements on the northern fringe of medieval Russia // The Archaeology of Medieval Novgorod in Context. P. 76–105.

[15] Spiridovna E. A., Aleshinskaya A. S. 2012. Results of palynological investigations at archaeological sites in the Lake Ilmen (Novgorod) and Lake Kubenskoye (Beloozero) regions // The Archaeology of Medieval Novgorod in Context. P. 10–39.

[16] Ibid.

[17] Альслебен А. Археоботанические материалы: зерновые продукты в питании средневекового населения // Археология севернорусской деревни X–XIII веков: средневековые поселения и могильники на Кубенском озере. Т. 3. С. 10–15, 211–213; Idem. The Plant Economy of Northern Medieval Russia // The Archaeology of Medieval Novgorod in Context. P. 321–350.

[18] Brisbane M., Cantarello E. forthcoming. 'Modelling changes in the forests of medieval Novgorod, Russia' (provisional title).

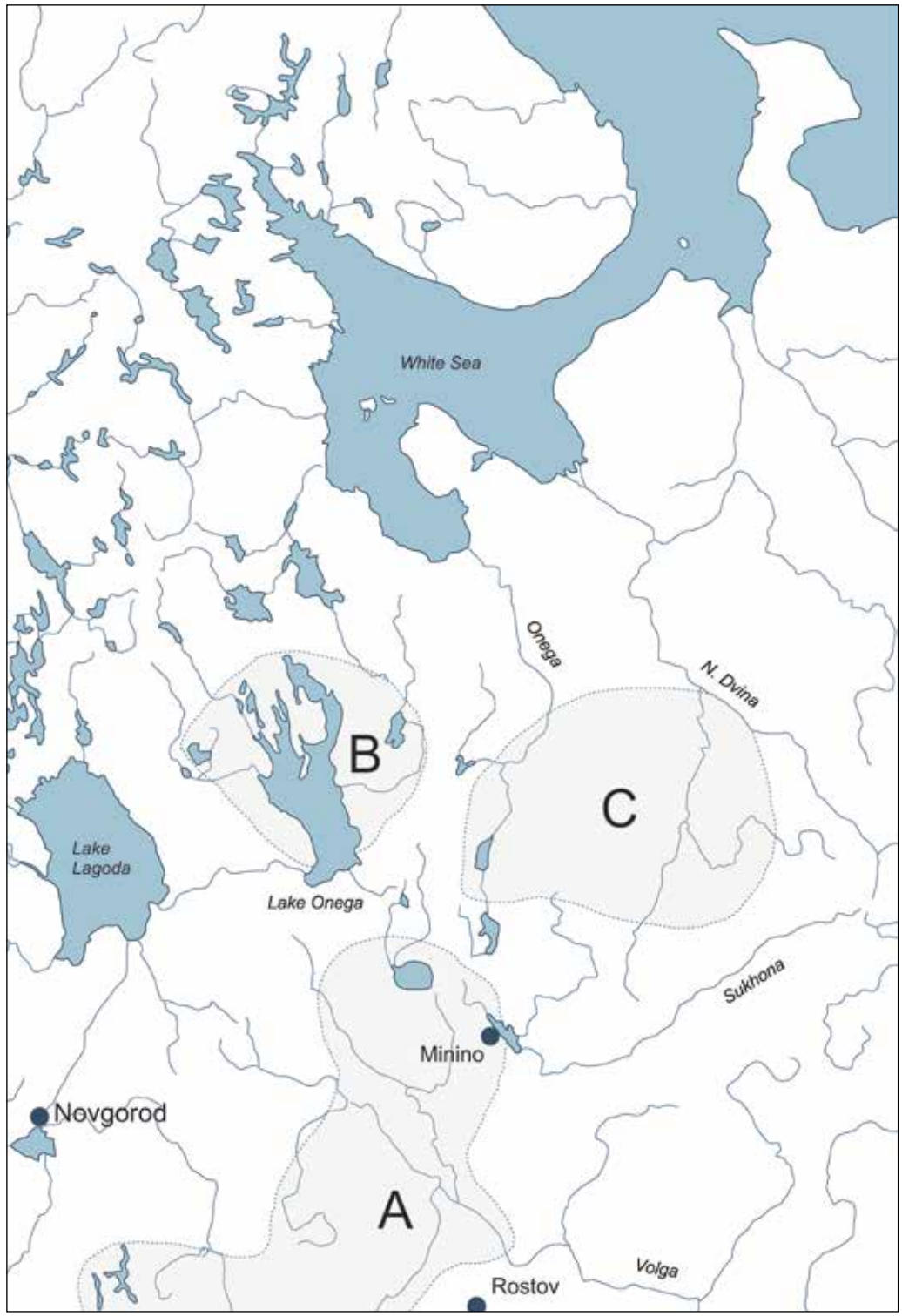

Figure 2. Areas of different types of settlement involved in fur collecting in northern Rus.

A: area of large, permanent settlements of the 10th to first half of the 13th centuries with high density of artefacts.
B: area of small, transient settlements of the 10th to 11th centuries with a low density of artefacts.
C: area of small, long term settlements of the 10th to first half of the 13th centuries with low density of artefacts.
(After: Археология севернорусской деревни X–XIII веков: средневековые поселения и могильники на Кубенском озере: в 3 т. / отв. ред. Н.А. Макаров. М.: Наука, 2009. Т. 3. Рис. 78, с. 68)

Minino in Its Wider Context

Two models (see fig. 2) have been developed by Nikolai Makarov and his team for settlements to the north of Novgorod[19]. The first could be called 'the Minino model' where permanency of settlement supported a mixed economy, i. e. agriculture and hunting. The second model held sway in the area to the north of Minino, known as 'the Zaoneshie' (literally, 'beyond the Onega'; a sizeable lake some 200 km north of Minino and Lake Kubenskoye). Here, archaeological evidence is emerging for settlements occupied seasonally where hunting and trapping appear to have been the main activities[20]. Within these new lands the role of portages as significant points in the colonisation process was recognised by Makarov after extensive study of six portages/river systems in the late 1980^{s} and 1990^{s}[21]. These waterways and portages had been used over a long period, as there is some evidence for sporadic use in the Neolithic, Bronze Age and Iron Age. However, the 11th century is the key period for development of portages and for the permanent settlements that were established around them, from the 11th to 13th centuries. This led Makarov to propose that the role of portages was crucial in transforming temporary, transient sites into permanent settlements, and convinced him that this was a form of colonisation by the Novgorodian city-state.

It is well known that Novgorod and Rostov maintained permanent settlements within the inner core of their lands. However, in the far-flung, outer regions there were seasonal camps for trapping fur-bearing animals and occasionally supporting tribute collectors, who operated right across the Iugra (the northern lands from the Pechora and Ob Rivers to the Urals and occupied by people of the same name), collecting from indigenous peoples, primarily Finno-Ugric tribes. This phase of expansion comes to an end shortly after the Mongol invasion of 1237, although the full extent of the impact of that invasion and its consequences is still very much debated. In general terms, Russia's development for the next 100 years or so is less expansionistic and more inward looking, concerned with satisfying the demands placed upon it by the Mongol invaders.

It would have taken some years before these northern areas were truly under the direct control of their homeland. And when they were, it was not Novgorod and Rostov, but the emerging state of Muscovy that undertook colonial domination. According to Martin, 'The first Muscovite campaign into the wilderness inhabited by the Iugra was undertaken in 1465'[22]. From the mid-15th century to circa 1500, Moscow and the khanate of Kazan gained control over access to the supplies of northern luxury fur, while Novgorod held on to its squirrel trade and the method of fur supply associated with that commodity[23]. Novgorod increasingly looked west to the Hanseatic League and the Baltic, while Rostov-Suzdal looked east and south until it was taken over by Muscovy and the khanates of Kazan. Finally, Novgorod was also annexed by Moscow in 1478, at which point its period of interest and control in the north was effectively over.

Contrasts With Novgorod

Equally crucial to understanding the nature and changes of the expansion and exploitation of the Novgorod Land is the evidence from Novgorod itself. It provides evidence of which resources were being directly consumed and utilised by the population of Novgorod. Comparing and contrasting the evidence from Novgorod with more distant sites, such as Minino, provide a useful cross-check for identifying the changing availability and exploitation of those resources over time.

The balance between wild and domesticated animals at Minino stands in marked contrast to that from Novgorod itself. From the excavations at Troitsky sites IX, X and XI, over 63,000 animal bone elements were recovered including over 33,000 identified mammalian remains. The identified material was dominated by bones of cattle and, to a lesser extent, by those of pig and sheep/goat. Bones of fur-bearing mammals form a very small proportion of the mammal assemblage in Novgorod. Beaver was the most common but only comprised 0.3 % of the identified mammal elements. Although skeletal elements of beaver provide only a tiny proportion of the Troitsky assemblage (<0.3 % of the identified mammal elements), the types of beaver bones represented on the Troitsky sites clearly indicate that whole carcasses were sometimes brought to the town (Table 1). Although mandibles are the best represented elements, many of the bones belong to the upper limbs. Foot bones are under-represented. These bones may often have been removed with the skins off-site. However, it is also possible that these small bones were commonly overlooked during normal excavation. More extensive sieving experiments are required to establish that their absence is not simply a factor of differential retrieval. Processing marks were observed on 37 % of the beaver elements recovered, excluding teeth. Clear skinning marks were observed near the orbits of one skull and on the buccal aspect (cheek) of a mandible. However, most of the re-

[19] Макаров Н. А., Захаров С. Д. Пушной промысел в хозяйстве кубенозерских поселений // Археология севернорусской деревни X–XIII веков: средневековые поселения и могильники на Кубенском озере. Т. 3. С. 68–79, 222–224.

[20] Археология севернорусской деревни X–XIII веков: средневековые поселения и могильники на Кубенском озере. Т. 3.

[21] Makarov N. A. Portages of the Russian North: Historical Geography and Archaeology // Fennoscandia Archaeologica, XI. 1994. P. 13–27.

[22] Martin J. Treasure of the Land of Darkness: The Fur Trade and its Significance for Medieval Russia. Cambridge: Cambridge Univ. Press, 1986. P. 95.

[23] Ibid. P. 92.

Table 1

Elements of beaver from Troitsky Sites IX–XI, Novgorod
(NISP = Number of Identified Specimens Present)

Element	NISP	Butchered
Maxilla	4	
Skull frag	3	1
Mandible	16	6
Teeth	6	
Scapula	6	5
Clavicle	2	1
Humerus	8	6
Radius	3	2
Ulna	6	2
Pelvis	10	5
Femur	7	2
Tibia	11	3
Fibula	2	
Astragalus	1	
Calcaneus	2	
Metatarsal	1	
Vertebrae	5	
Ribs	7	2
Total	100	35
% butchered (excluding teeth)		37,2

maining butchery marks were made during dismemberment and filleting of the shoulder, pelvis and upper limbs rather than skinning (tab. 1). It is fair to say, however, that the beaver's and other wild mammal species' great importance as providers of pelts for regional and international trade is not reflected in the zooarchaeological material from Novgorod itself where the assemblages are dominated by bones associated with meat consumption rather than skinning.

These findings are in marked contrast to the evidence from Minino, where, as discussed above, the inhabitants ate much more meat from wild mammals than the residents of Novgorod. Beaver is the best represented species forming 35 % of the assemblage[24]. Again these bones include many elements from the upper limbs. Other animals hunted for their pelts, particularly squirrels and marten, also provided significant amounts of meat for the local community.

The impact of incoming hunters and trappers on the wild animal population is reflected in the bone evidence. From the 11th to 13th century the number of elk that were exploited grew, while beaver declined, although not catastrophically. While the evidence for beaver exploitation declines, that for squirrel increases, a fact also borne out by the documentary evidence, which shows huge numbers of squirrel pelts being extracted from the forest[25]. It is interesting to note the lack of bone evidence for sable at Minino and other nearby sites; this is because these were trapped further north – a driving factor for both Novgorodian and Suzdalian expansion north-east of Minino into the area known as the Zaoneshie.

Beaver Decline

Let's examine the evidence for beaver decline in more detail. As noted above, the importance of Novgorod in the international fur trade is well known. There is evidence, however, that the numbers of beaver caught by the inhabitants of Minino fell significantly in the 13th century. The percentage of beaver decreases from 41 % in deposits dated to the 11th and early 12th century to 22 % in features of 13th century date, with corresponding decreases in the numbers of squirrel and marten bone[26]. Overexploitation, possibly reflected in the beaver mortality patterns at Minino, and the clearance of woodland for agriculture and pasture are both likely to have been factors in their decline. This also seems to be reflected at Novgorod. There are scarcely any beaver remains from the upper layers of the Troitsky deposits, which date from the 13th to 15th centuries. This supports other evidence for the decline in the beaver fur trade at this time[27]. It is probably also significant that none of the Novgorod birch-bark documents that make reference to beavers are dated later than the early 13th century[28]. The beaver assemblage from Novgorod probably mainly consists of animals captured in the near vicinity, which provided an occasional supplement to the urban diet. This local beaver population may have largely disappeared by the later medieval period.

Therefore, the international importance of the Novgorodian fur industry is best reflected in the composition of the zooarchaeological assemblage at Minino, located near one of the major procurement areas.

[24] Makarov 2006; Savinetsky A. B. Archaeozoological materials from Minino and changes in populations of utilized mammals from the North of European Russia from the Mesolithic to the Medieval Period // ed. Maltby M., Brisbane M. Animals and Archaeology in Northern Medieval Russia: Zooarchaeological Studies in Novgorod and its Region. Oxford: Oxbow. [Forthcoming].

[25] For Novgorod trade in squirrel pelts see Martin J. Treasure of the Land of Darkness: The Fur Trade and its Significance for Medieval Russia. Cambridge: Cambridge Univ. Press, 1986. especially 61–85 & 151–63; Makarov N. A. The fur trade in the economy of the northern borderlands of medieval Russia // The Archaeology of Medieval Novgorod in Context. P. 381–390.

[26] Makarov 2006; Savinetsky A. B. Op. cit.

[27] Martin 2004; Makarov N. A. The fur trade in the economy of the northern borderlands of medieval Russia // The Archaeology of Medieval Novgorod in Context. P. 381–390.

[28] Rybina 2007, 132.

Here, many of the skinned animals were also butchered for meat. However, the beaver's importance is not evident in the faunal assemblage from Novgorod itself. Most skinning took place elsewhere and therefore it was their pelts, rather than their meat that was brought to the town. In addition, the majority of the pelts were subsequently exported. Zooarchaeological evidence for the importance of furs and skins of all wild species to the inhabitants of Novgorod is therefore likely to be extremely limited.

Studies of the evidence for the exploitation of beavers in Novgorod have been used to illustrate the benefits of a holistic approach to medieval urban studies. To understand the complexity of life in a medieval town, it is necessary to embrace as many sources of evidence as possible. A similar approach can be made for the investigation of the importance of other species found in Novgorod. For example, the importance of fishing to the Novgorod economy is only partially reflected in the zooarchaeological data currently available[29]. A much more extensive programme of sieving is required to establish more clearly the importance of the exploitation of fish, birds and many of the smaller mammal species including beaver and squirrel. This assessment has also demonstrated that there are opportunities to make much more detailed comparisons of the faunal assemblages within and between properties and between different areas of the town. To achieve this, however, a much more systematic collection policy for animal bones and other environmental data is required. The results at Minino provide an excellent illustration of how a systematic sieving programme can enhance our understanding of animal exploitation.

The study of the beaver remains in particular has demonstrated that the study of urban bone assemblages has to be complemented by analyses of remains recovered from other settlements within the region.

Forest Changes

As is well known, Novgorod is built almost entirely of wood and thus exploited its forests extensively, not only for building and street construction, but also furniture, domestic and agricultural items, tools and everyday items as well as fuel for heating and cooking and fodder/pannage for animals. Due to excellent organic preservation, wooden objects of all kinds have been excavated, studied and published, indicating how different tree species and tree sizes were selected for particular uses[30].

A current project is underway to attempt to map the forest and its exploitation. It will use archaeological evidence from sites in Novgorod and its hinterland, as well as pollen and other ecological studies. The project adopts a novel approach, using a forest simulation model constructed using a programme known as LANDIS II. This software is normally used by ecologists to predict the long term impact of different forest management regimes. The study will use LANDIS to model forest change from approximately AD 700 to 1500, using different scenarios to see how the main species were affected[31].

Using conifers (predominantly pine and spruce) and key deciduous trees (oak, lime, ash, etc.) and taking into account soil types, height above sea level, hydrology, climate and the accessibility of the forest, three or four possible scenarios for forest exploitation will be presented, each with varying degrees of intensity of exploitation. These will be checked against historical surveys and maps of the Novgorod forest from the 18th and 19th centuries.

In this way, a clearer model should emerge that helps to show how the intensity of land clearance together with the extensive exploitation of woodland through activity such as artisan production and town construction impacted on the forest, its ability to regenerate, the decline of certain species (deciduous mainly), and the deliberate removal of older and larger trees for construction and other purposes[32].

Furthermore, it should be possible to trace the impact on the forest from around the 6th or 7th century when an early phase of forest clearance, most likely using slash and burn methods, took place around lakesides and along river valleys. This would have continued into the 8th and 9th century when clear-felling becomes more widespread but almost certainly continued into the 10th century and beyond[33]. The demands of Novgorod's growing population meant that from the 10th to 14th century there was a phase of more intensive forestry with selected harvesting of species. This would be affected by the desirability of each tree species due to the quality of the wood and the size of the tree. Other factors affecting selection include the accessibility of tree types due to their location, distance from the town or the river, the local terrain, ownership and rights of access.

At this stage the above research is only exploring a series of hypotheses for testing, but it is hoped that running more simulations using LANDIS may develop this model further. While it may never be possible to recreate accurately the total forest cover of the hinterland of medieval Novgorod, it should be possible

[29] Brisbane and Maltby 2002; Maltby 2012.

[30] See for instance papers in: Wood Use in Medieval Novgorod.

[31] Brisbane M., Cantarello E. Modelling changes in the forests of medieval Novgorod, Russia (provisional title). [Forthcoming].

[32] Tarabardina O. Building timber in medieval Novgorod based on materials from the Troitsky XI and XII excavations // Wood Use in Medieval Novgorod. P. 106–118.

[33] See for example the debate about forest clearing in: Ankudinov I.Y. 2001. 'Novgorod birchbark documents as a source on the history of assarting new land // 50 years since their discovery, 50 years of their study: Materials from an International Conference held in Novgorod, Sept. 24–27 / ed. Yanin V.L. Novgorod, 2001.

to suggest ways in which the forest was exploited that appear credible when assessed against other types of evidence. Comparisons of forest changes over time between the immediate hinterland of Novgorod and the far-flung settlements to the north and east, such as Minino, should help to put these medieval sites into their environmental setting and allow us to examine their impact on local ecology.

Conclusions

Favourable ecology would have influenced greatly the choice of region for expansion, with areas of abundant, desirable natural resources having particular appeal. Also, the extent to which the environment was suited to permanent settlement influenced whether there were established indigenous communities in place who could serve as procurers of desired resources.

The original motive for moving into a new territory changes over time. At first activities may be motivated by individuals' desire to exploit and profit from a natural resource (in this case, fur); however, they soon acquire other, less individually-oriented motives, such as the domination of an indigenous population through the taking of territory by an expanding entity (in this case the princedom of Novgorod).

It is also important to consider the immediate and long-term impact of the incoming population on the ecology of the settled region, in particular changes to flora and fauna. As has been demonstrated above, this can be investigated through the analysis of pollen, plant macrofossil and animal bone evidence. These can be used as the basis to develop detailed models of landscape and vegetation change.

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Резюме

Марк Брисбейн, Эллен Хэмблтон, Шейла Гамильтон-Дайер, Марк Молтби

Размышления по поводу экологического контекста и воздействия на окружающую среду расширением средневековых поселений в Северной Руси

Благодаря исследованиям под руководством директора Института археологии РАН Н. А. Макарова около Белоозера и Кубенского озера в Северной Руси, получены свидетельства существования долговременных поселений XI в. в регионе, который раньше считался местом только временного проживания в этот период, в основном охотников за пушным зверем. В статье рассматриваются свидетельства, касающиеся обширных поселений в области Белоозера, включая остатки поселений и могильников вместе с предметами материальной культуры. Обсуждается вопрос о том, в какой степени окружающая среда влияла на развитие поселений, и оценивается, как некоторые особенности данной среды (кости не только диких, но и одомашненных животных; использование лесных ресурсов) определяли различные типы поселений и длительность их существования. В работе рассматривается воздействие поселений на окружающую среду, а также некоторые другие явления, вызывающие распространение и рост поселений в данной части Руси, как, например, торговая и коммерческая деятельность, политические устремления и конкуренция между расширяющимися политическими образованиями, в частности, Новгорода и Ростова Великого.