Double-crop Pocket Zones and Empires
The Case of Swat

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> There is no natural feature of the country [i.e. Swat]
> which has not been turned to advantage.
> The immense flats are flooded periodically as of old,
> and produce a rice harvest second to none in India.
>
> From Alexander E. Caddy Esq. on special duty
> to the Chief Secretary of the Government of Bengal.
> Dated Camp Chakdara [Swat], 13th May 1896.
> (Olivieri 2015a: document no. 42).

Introduction

When this contribution was conceived in 2019, my goal was to explain the meaning of a series of constants that were not very noticeable but statistically congruent.[1] These constants appeared as small but obvious signs of discontinuity in the chronometric and stratigraphic sequence of the Swat Valley and, in particular, of its central site, the ancient urban settlement of Barikot.[2] The geographical and historical context here is that of the Karakoram–Hindu Kush piedmont of the macro-region known as Gandhara in the time span between the end of the second millennium BCE and the beginning of the first millennium CE.

1 I would like to thank Lauren Morris for her great editorial work on the manuscript of this contribution. It is thanks to her that this short essay of mine has taken the form it has now, which is the form I had hoped to give it from the moment of its initial writing.

2 On the importance of the site, see Petrie 2021, 178–179.

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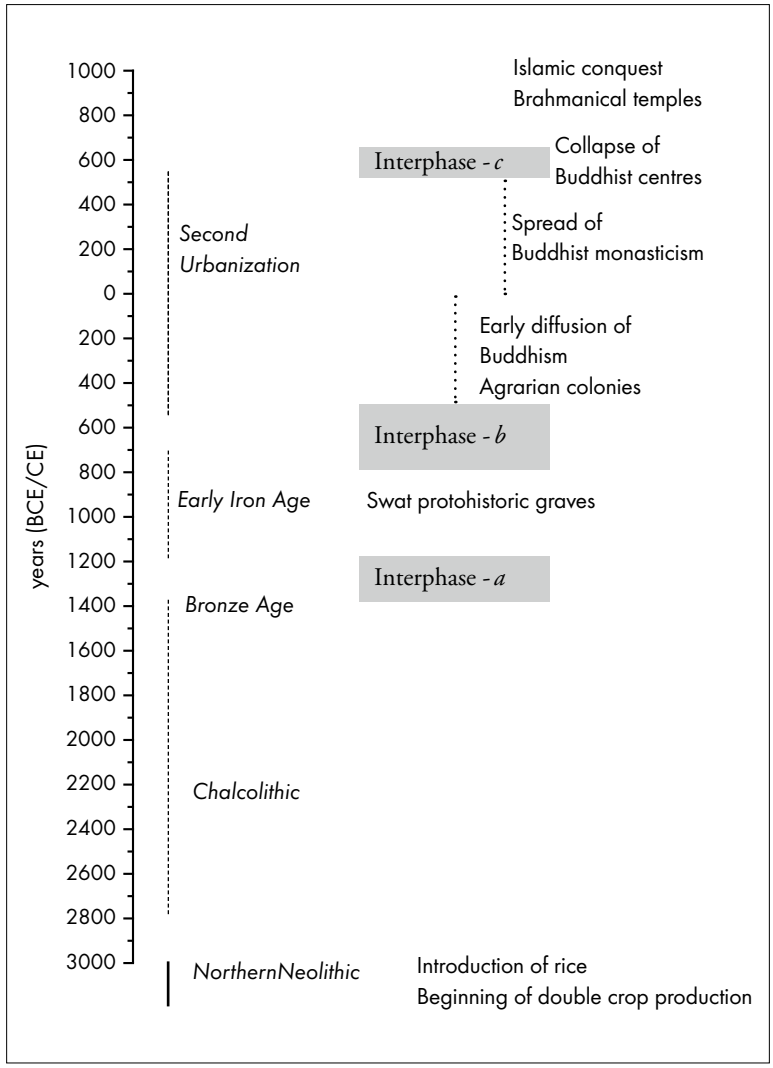


Chart 1 The interfacial sequence of the Swat Valley 3000 BCE–1000 CE.

Such signs of discontinuity, which actually contain important information for understanding human–environment relations in this delicate context, can also be defined in archaeology as "negative interfaces." This term is mainly used to define elements of anthropogenic or natural interventions resulting from intentional/unintentional ablation or obliteration of part of the stratigraphic deposit. Failure to understand such phenomena can induce serious errors in the interpretation of the stratigraphic

sequence and its chronology.[3] Still more elusive kinds of negative interfaces are represented by absences of activity, i.e., by real phases of stasis in the anthropogenic deposition process. In this contribution, I am concerned with the latter variety of negative interfaces, also known as "interphases." In the otherwise extremely rich stratigraphic history of the Swat, three interphases are recognized: those between 1400 and 1200 BCE (Interphase - *a*), between 800 and 600 BCE (Interphase - *b*), and between 500 and 700 CE (Interphase - *c*) (see Chart 1).[4]

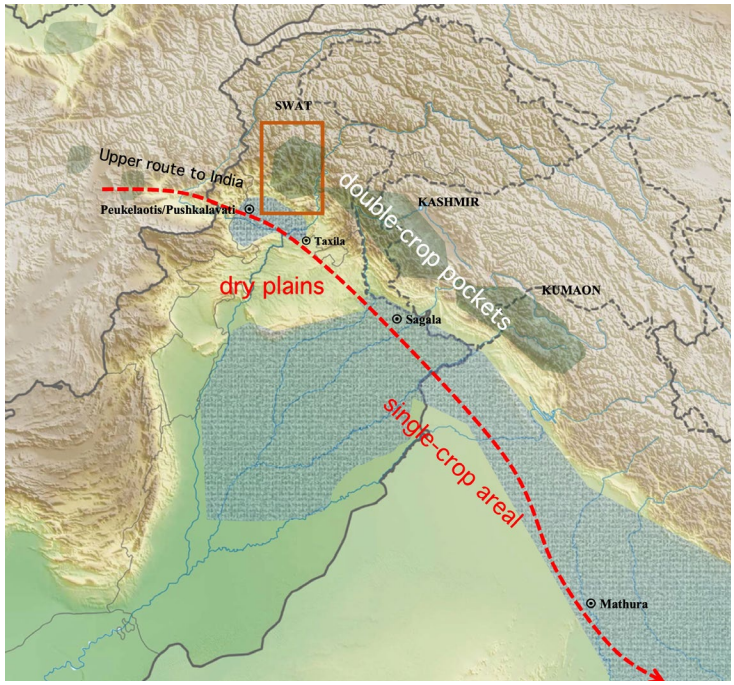
The exceptional nature of these phases in the context of the standard anthropogenic sequence in Swat can be hypothetically explained by climatic crises, or at any rate, by high-impact exogenous factors. This is especially clear when we consider what was Swat's great fortune for human settlement, namely, the combination of climate, water, fertile land, and hours of insolation per annum that made this valley one of the most important economic double-crop pocket areas in this part of Asia during antiquity. Initial reflections on the significance of these pocket zones led me to think more about the power relations between consumer centers and their productive peripheries—in our case, between large cities of the plains and the productive plains of Swat.

Physical Setting

Geography

The setting of the archaeological data considered in this contribution is the median stretch of the Swat River valley or Middle Swat, located in the piedmont of the Hindu Kush–Karakoram–Himalaya (Fig. 1). Middle Swat is morphologically different from the upper valleys. Upper Swat is a typical north–south U-section glacial valley, which is characteristic of the region. As the average height of the mountain slopes decrease to 4,000 m AMSL, the valley gradually opens up. This marks the beginning of Middle Swat, where the river flows from east-northeast to west-southwest. From this point, Middle Swat features an enclosed fertile highland, modeled after an ancient tongue-shaped glacial lake. This fertile enclosure is formed by a silty alluvial plain of approximately 1,000 km², including also the main tributary valleys, lying at an average altitude of < 900 m ASL. The floodplain soils are rich in minerals, such as phosphorus, and nitrogen.[5]

3 See Olivieri 2020a.
4 A synthesis of these issues has been published in Olivieri 2020b; see also Olivieri 2022a.
5 On agricultural soil, agricultural production, and land use in Swat, see, e.g., Nafees et al. 2008; Nafees et al. 2009; Qasim et al. 2011; Qaim et al. 2012; Atta-ur-Rahman et al. 2016.



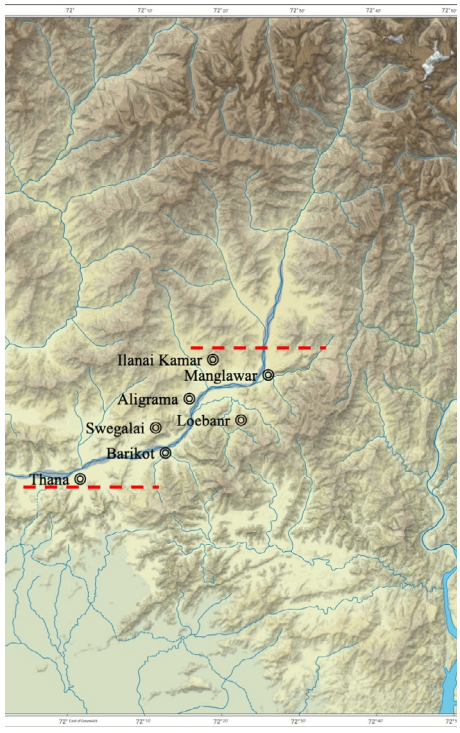


Fig. 1a+1b Double-crop pocket zones of the Hindu Kush-Karakoram-Himalaya, with Middle Swat in inset.

Fig. 2 The ager of Barikot seen from SW.

The right bank of Middle Swat is characterized by at least three major tributary alluvial fans that were exploited by important ancient settlements. The northernmost of these settlements was Damghar, an important agricultural hub and a key site in Moghul times. Damghar is then followed by Aligrama and Ilanai Kamar—two well-known sites for protohistoric agricultural production—and then Swegalai, which featured an important phase of occupation dated to the first millennium CE. On the left bank of the river, there were four large alluvial fans. Closer to the northern limits of the most favorable climatic zones lies the agricultural hub of Manglawar, the region's capital in the thirteenth century.[6] At the center of the valley, two major protohistoric farm sites (Kalako-dherai and Loebanr III) are located at the confluence of two tributary rivers near present Mingora, a major urban center until the medieval period.[7] Fifteen kilometers further to the southwest were three interconnected fertile valleys representing the vast *ager* of a second large ancient settlement, now Barikot, which will be thoroughly discussed in this contribution (Fig. 2). The largest plain lies

6 On Manglawar, see below.

7 On the ancient urban area of Mingora, the ancient Massaka/Massaga (Menjieli), see Iori 2023a, with further references therein.

downstream in the area of Thana, where the pass of Shahkot—the major gateway of Swat—is located. Each of these zones on both sides of the river in Middle Swat is separated by mountain ridges, producing different micro-climatic zones. Thana, for example, is more humid; Barikot/Swegalai is drier; and the zone between Mingora/Aligrama and Manglawar/Matta is cooler (fruit farming is dominant there nowadays). Manglawar/Matta represents both the upper limit of double-crop agriculture and of the Middle Swat zone.

Climate

Water supply in Middle Swat is guaranteed by permanent glaciers and winter snowfall in Upper Swat (where peaks reach 5,000–6,000 m AMSL). This regular resource is seasonally melted through the mild exposure of the highest valleys to the summer monsoon. Besides the wealth of water, the particular temperate climate of Middle Swat (having a west–east orientation) benefits from exposure to sunlight throughout the day. Through convection, this favors regular breezes from the valley and mountains at sunrise and sunset. Winter is mild and summer is moderately hot, although humid. The northern mountain barriers contribute to protecting summer crops from excessive cold and rain, while the southern mountains help to store the summer warmth and humidity until mid-November.

Double-crop Production

Given these conditions, it is not surprising that archaeological evidence has proven that double-crop agriculture has been practiced in Swat since at least the Bronze Age. Double-cropping refers to the ability of farmers to produce two staple crops from the same piece of land in the same year, with harvests taking place in late spring and in fall. In natural conditions, double-cropping is made possible from the combination of a mild fresh climate and an abundance of water throughout the year. In South Asia (here also "the Subcontinent"), such conditions are only found in valleys with generally scarce exploitable land at medium-high altitudes. Thus, zones featuring the natural conditions for double-cropping as well as available, cultivable land are rare. Although such zones were marginal in respect to long distance trade, they have been always strategically crucial for organized states, including empires. Such states maintained an interest in protecting the surplus capacity of double-crop pocket zones, as well as steering agricultural production in these zones in reference to their own needs.

Double-crop Pocket Zones

In the northwest of the Subcontinent, the list of these pocket zones is short, although future research may assess whether the valleys of Lower Kunar and Nangarhar, as well as Loghar and Kapisa—traditional breadbaskets at the south of the Hindu Kush—can also be described as such zones. Immediately to the north of Kapisa/Begram, on the other side of the Hindu Kush, lies the valley of Baghlan, with its center at Surkh Kotal.[8] The region, possibly mentioned in the inscription of Rabatak as "the plain of Kasig,"[9] must have had great agricultural importance,[10] also taking its altitude and orientation into account. When coming from the south, this area was possibly the first large double-crop pocket zone in Bactria before reaching the plain of Balkh.

Farther east, along the piedmont of Hindu Kush–Karakoram–Himalaya, the following zones have been archaeologically studied: Swat, Hazara, Kashmir, and Kumaon.[11] The critical mass of data yielded by Swat, however, is comparatively high and detailed enough to allow the elaboration of a hypothetical model on the strategic role of these agricultural production zones in antiquity.[12]

An Interpretative Model

Highlands and Plains

To explain the relationship between plains and mountains in Gandhara, we can start with a significant example from recent colonial history (recalling also that the relationship between empires and productive peripheries is precisely the theme of this contribution). One side effect of—if not a reason for—British expansion across the Hindu Kush was the catchment of Swat's water resources for a program of agricultural exploitation, namely, producing sugar cane and tobacco. But, in fact, before the establishment of the Swat canal system in the early twentieth century, the territories of ancient Gandhara (to the south of Swat and to the west of the Indus)

8 See Olivieri and Sinisi 2021.
9 Falk 2015, § 096, l.8.
10 Hill in Falk 2015, 66.
11 The importance of double-crop areas in ancient India was also noted by the Greeks; see, for example, Diodorus Siculus [Diod. Sic.] 2.35.3. For further elaboration, presented within an extremely important synthesis of agrarian technologies and policies of early Indian states, see Daffinà 2019, 558.
12 See, recently, Yang et al. 2019.

were nothing but semi-arid savannas. The area of Charsadda, the regional capital of Pushkalavati, had served as a hunting ground for rhinoceros and other big game in the early sixteenth century. Of course, this land must have also hosted agricultural fields, but their annual production would have totally depended on the monsoon (single-crop or *kharif*-crop). However, the naturally irrigated Swat offered the conditions for steady double-crop production, which allowed the Moghuls to excise higher taxes in grain ass-loads there in comparison to those imposed in the capital cities of Kabul and Ghazni.[13]

Unfortunately, for earlier periods we can rely only on indirect evidence. Nevertheless, the overall picture of the data allows us to formulate the following model, taking the final stage of the first millennium BCE as an example. While the available data for the early first millennium BCE seem to indicate a semi-arid phase with reduced monsoon activity, from about the sixth to the fifth centuries BCE, there are clues pointing to a long warm-humid phase in Swat.[14] While the botanic evidence of Swat (and particularly Barikot) is rich, the evidence at Charsadda-Pushkalavati is meager. An absence of chaff or cereal waste products has been noted there, which may be interpreted as a proof that these cereals were not locally cultivated but, rather, imported, possibly from Swat and its surrounds.[15] The regional capitals of Pushkalavati and Taxila, established along the major trade route to India linking Kabul to Pataliputra, were therefore dependent on the double-cropping climate of the highlands for their regular supply of staple agricultural products. Once these pieces of information are put together, the early foundation of a city at Barikot may perhaps be now understood as the establishment of a center of control, functioning to collect, store, and protect the strategic resources of the territory.[16] We may thus envisage a kind of fortified colony that was functional to the life and economy of the regional capitals, which had thus far been built along major trade routes but otherwise less favorable terrain.

13 See Barth 1956, 1080. In the early sixteenth century, the area of Charsadda and its surroundings were hunting grounds for rhinoceros and other big game (see, e.g., *Bāburnāma* fol. 222b [Thackston 2002]). Locally, agricultural fields would have been single-crop or *kharif*-crop (compare the taxation amount in grain ass-loads *Bāburnāma* fol. 131; 220; 236b [Thackston 2002]).

14 Preliminary data from Barikot (LASER CHIP project; see below). We have no direct data on the paleoclimate of the region except for the first data from the ongoing study in Barikot (see below). Apart from these, we refer here mainly to Coningham and Young 2015, 50–52; Joshi et al. 2017; Giosan et al. 2018; and, particularly, to Spate 2019 and Jan et al. 2019.

15 See Ali and Coningham 2007 in addition to Young 2003.

16 Again, see Daffinà 2019.

The Control of Resources

Let us take, for example, a moment particularly rich in important first-hand information: the Macedonian expedition to Swat (327 BCE). At the time of Alexander, although in a phase of political fragmentation,[17] Swat still was the most important source of food in the region.[18] The need to control food resources of Swat certainly defined the military strategy undertaken by Alexander, so that supplies and safe control of the *uttarapātha*, the northern road to India, could ultimately be guaranteed.[19] In fact, the city of Bazira (Barikot; see below) is described by a first-hand source of Curtius Rufus as *opulenta*, a term clearly indicating agricultural wealth that is otherwise very parsimoniously utilized by the Roman historian; it appears elsewhere only in reference to Tarsos, Babylonia, Persepolis, and Bactra.[20] Ptolemy I Soter, a general of Alexander during the Swat campaign, reports (Arrian, *Anab*. 4. 25. 4) of "large herds of superior quality" seized by Alexander and sent from here to Macedonia. Once Swat was secured, in addition to a great wealth of grain in granaries at Ecbolima (near the Ambela pass, between Swat and the Indus; *Anab*. 4. 28. 7),[21] Alexander joined the great part of the army waiting for him at the ford on the Indus, along the *uttarapātha*. The latter is a "winter road," typically used when the level of the Indus and the rivers of Punjab are at their lowest level, so that they can be easily forded. The detour of Alexander in Swat and his march to the Indus thus took place—as Babur would realize to his own cost more than a thousand years later—at the best time of the year, when not only were the water levels of the rivers favorable but the harvesting and storing of seasonal crops had concluded: "It was the end of the year, only a day or two left in Pisces […] if we went now to Swat the soldiers would not find any grain and would suffer. […] Next year we should come earlier, at harvest time […]."[22] After Alexander, the strategy of control of agrarian resources is again well testified in Indo-Greek times. If our reconstruction is correct, Swat might have been thus fortified during the formative

17 See Curtius Rufus, *Hist*. 8.10.1. With reference to Alexander's strategy in Gandhara and the availability of food resources, see also Strabo XV, 1, 26.

18 In fact, the ongoing study of the Swat paleoclimate (LASER CHIP) is showing that, while the Gandharan region continues to be affected by a prolonged process of aridification around the mid-first millennium BCE, the Swat valley (on a local scale) shows an opposite trend, i.e., a gradual attenuation of aridity/semiarid conditions, already between 400 BCE and 100 CE. See Current Hypothesis, below.

19 The detour of Alexander in Swat is otherwise inexplicable (Coloru and Olivieri 2019; Olivieri 2020c).

20 I owe this information to my colleague Luisa Prandi of the University of Verona. See Spengler et al. 2020; Coloru and Olivieri 2019.

21 Coloru and Olivieri 2019, 101.

22 Trans. Thackston 2002, 268.

phases of the Indo-Greek kingdom to protect a crucial economic pool—this time, for the new Pushkalavati.[23]

Some Tentative Figures

To better understand the magnitude of the problem we are confronting, we should try at this point to establish the provisional size of agricultural production in Swat. If an estimated 1,000 km² of arable land were suitable for double-cropping, under optimal conditions (which we now know remained so in Swat for at least seven centuries in early historic times),[24] and if all this land were put into agricultural use at the same time, enough food would have been produced to feed well over half a million people. In premodern times, the population never exceeded this figure. Following the model presented by Monica Smith,[25] there might have been well below 200,000 inhabitants in Swat at the peak of its urban and monastic development at the end of the second century CE.[26] Following Dieter Schlingloff's model,[27] all the known cities of Swat[28] might have been inhabited by around 30,000 people in total, approximately 6,000 of which could have lived at Barikot (12 ha). This figure should not be too far from the truth. According to the intelligence reports collected in the *Frontier and Overseas Expeditions from India* updated until 1907, the total population of the valley was estimated at about 96,000.[29] Forty years later, at the climax of the political stability created by the Yusufzai State of Swat, a census of the valley registered ca. 300,000 inhabitants.[30] With

23 See Coloru, Iori, and Olivieri 2021.

24 Albeit on a preliminary basis, the LASER CHIP project is demonstrating, through the study of isotopes of paleosols, the existence of a climatic optimum between the middle of the first millennium BCE and the third–fourth century CE. This time span corresponds exactly to the emergence, development, and decline of Bazira as an agricultural colony and corresponds to the spread of Buddhist monasticism, the spread of cotton cultivation, etc. (see the recent communication of Dario Battistel, DAIS, Ca' Foscari University of Venice, presented in the framework of the Workshop "The long 8th century CE" (27/11/2023–01/12/2023) at the Zentrum für interdisziplinäre Forschung, Universität Bielefeld). As a side note, one might consider, but on a very preliminary basis, that although the LASER CHIP data demonstrate a marked climatic exceptionalism in Swat, in this case the phenomenon might be observable at the macro-regional level in Eurasia, making the "Gandharan optimum" in chronological and macrophenomenal terms coincide with the well-studied phenomenon of the "Roman optimum."

25 Smith et al. 2016.

26 Xuanzang reports the presence of (only?) 18,000 monks in the best years of Buddhism in Swat (Xuanzang III, 1).

27 Schlingloff 2013.

28 Aligrama, Menjeli/Massaka/Barama, Ora/Udegram, Bazira/Barikot.

29 Intelligence Branch, Army Head Quarters India 1907, 322.

30 "Pathans number about 450,000, Kohistanis perhaps 30,000. The number of Gujars [nomadic herders] in the area is difficult to estimate." (Barth 1956, 1079; based on data from 1954).

these figures, it is evident that a great part (more than fifty percent in ancient times) of annual agricultural production was suitable for export. Not only were agriculture and farming activities—in addition to forestry, mining, and the stone industry—the main resource of Swat, they were also a resource that exceeded the similar economic potential of neighboring regions.

The Current Hypothesis

We hypothesize that the fortified city at Barikot was founded at the center of an exceptionally wealthy natural environment within the economic and strategic space of a macroregional political entity (during the expansion of the trade contacts between the Achaemenian satrapy of Gandāra and the states of Gangetic India), which would have necessitated the militarized protection of these resources. These geo-strategic conditions were the prerequisites for urban development at Barikot. In noncentralized political environments, as we will see, cities can contract or even disappear; but this does not affect agrarian production, simply the structure of production. In the following pages, I will attempt to substantiate these initial assumptions with the data available so far.

Archaeological Data

Direct Evidence 1: Paleobotany

Our data on the agricultural importance of the Swat valley are based on a seriation of different sets of information, which will be only briefly presented here alongside key references where the reader may find further details.

The paleobotanic evidence relating to prehistoric Swat does not need to be restated here. We can refer to the pioneering work of G. Stacul and L. Costantini,[31] where evidence of double-cropping was first presented and discussed.[32] Early double-crop agriculture, which in Swat basically entails growing wheat or barley and rice (C_3 cereals), is largely documented in the agrarian settlements excavated at Loebanr III, Aligrama, Kalako-dherai, and Barikot. All those agrarian settlements were established already during the so-called Northern Neolithic, when improved climatic conditions favored the spread of settlements both in Kashmir and in Swat between the third and second millennia BCE.[33] It may

31 See Stacul 1987 and Costantini 1987, with further references therein.
32 See also Fuller 2007.
33 On Kashmir, see the important recent contribution by Betts et al. 2019.

Fig. 3 Paleobotanical remains from Barikot: *Hordeum vulgare*, *Oryza sativa*, *Gossypium* sp. and *pisum captivum*.

be noted here that Swat and Kashmir share some geographic characteristics, such as altitude, climate, morphology (both are palaeo-humid zones/lakes), and environment.

More recently, a significant quantity of organic material (over 5,500 complete seeds and thousands fragments of cerealia and legumes) was collected during the excavations at Barikot by the ISMEO-Ca' Foscari Italian Archaeological Mission in contexts dated between 1200 BCE and 50 CE (Fig. 3).[34] The material was analyzed at Max Planck Institute, Jena, under the supervision of R. Spengler.[35] 97.8 percent of the complete seeds refer to domesticated plants, to which fruits and nuts, such as grape, hackberry, and other plants, should be added. C3 cereals dominate the collection. During the 2021 excavation season, 2,700 other seeds were collected from Barikot. Here most of the seeds, to our surprise, were cotton seeds (*Gossypium* cf *arboretum*/*herbaceum*; n = 1,043), a cash crop that was first introduced to Barikot at a time of agricultural intensification associated with both a warm-humid climatic optimum and the beginning of urban settlement, around the middle of the first millennium BCE.[36]

34 For these absolute dates, see Olivieri et al. 2019.

35 Spengler et al. 2020.

36 Olivieri et al. 2022. In 2022 and 2023–2024, the collaboration with the Jena group coordinated by R. Spengler continued, and several thousand more seeds, mostly cotton and rice (even in subsequent phases, until c. 1200 CE), were collected by R. Dal Martello (Ca' Foscari University of Venice).

Overall, among food crops, barley is the most represented cereal (ca. 24 percent of 2,700 total seeds of 2021), followed by rice (12 percent), and wheat (6 percent), and then different varieties of legumes, fruits *et alia*. To cite the concise summary of the significance of these data in the published report, "This is a diversity of crops and intensity of agricultural systems unlike anything that has been identified at any archaeological site further north in Central Asia at this time. Many of these crops, notably the warm-weather legumes, are absent from archaeobotanical results from Central Asia, but they are present further south in the Indus valley. […] Likewise, many of these crops, notably *Oryza sativa* and *Gossypium* sp., are extremely water demanding and would have required irrigation, as rice is traditionally grown in wet fields in this region."[37] One should not be surprised by the absence of C4 cereals in the Swat documentation, in particular the more weather-resistant but less productive millet. Noting that millet is not cultivated even in modern times, and it may never have been part of the diet in the region of Swat,[38] we can hypothesize that the negative evidence reflects the favored climate of ancient (and modern) Swat.

Direct Evidence 2: Visual Representations

The role of agriculture in late protohistory was so important that we also have a few exceptional visual representations of the agricultural cycle documented in the earliest painted shelters in Middle Swat. In particular, we refer here to the interesting testimony of the Bronze Age painted rock shelters of Kakai-kandao and Sargah-sar.[39] In particular, the latter paintings depict the ancient Indian binary of *grām*/*vana* ("village/wild") (Fig. 4). If the *vana* world shows the opposition between ibex and felines, the *grām* or cultivated world shows the complete agricultural cycle: from plowing to sowing to the harvest rituals.[40] All the images are assembled around a central pictogram representing a large anthropomorph inserted in a sowed field that recalls the divine essence of the cultivated field, known in the *Ṛgveda* as Kṣétrapati.[41] Agricultural work is rarely represented in Gandharan art; it appears more frequently in depictions of the ritual plowing of Siddhārta's father, Śuddhodana ("he who grows pure rice") in scenes representing the "First Meditation of Siddhārta."

37 Spengler et al. 2020.

38 A. Nayak (Max Planck, Jena), personal communication (2021). There is an article on this subject about to be published with A. Nayak as first author.

39 See further details and additional references in Olivieri 2015b.

40 See Daffinà 2019, 543.

41 Olivieri 2015b. See also Vidale, Micheli, and Olivieri 2011. Swat is mentioned as Suvastu in the *Rigveda*.

Fig. 4 Paintings from Sargah-sar depicting the ancient Indian binary of *grām/vana* (village/wild) (l. max. 2 m; surface c. 6 m²).

Direct Evidence 3: Techniques

Direct evidence of agricultural practice is revealed by an overwhelming presence of agricultural tools, from the so-called "perforated knives"[42] of the Northern Neolithic and Bronze Age of Swat (Fig. 5a) to the iron scythe blades of the historic phases, as well as the great number of grinding tools, ranging from traditional saddle-shaped querns to the revolutionary rotary querns, introduced during the first century CE (Figs. 6a and 6b).[43] Domestication of zebu, at least since the third millennium BCE,[44] points to the next piece of evidence to be noted here, described as "one of the most remarkable discoveries" in Swat:[45] a plowed paleosol, most probably a rice paddy field, documented at Aligrama in context associated with the Late Bronze Age (Fig. 5b).[46]

42 See Vidale et al. 2011, with further references.
43 See De Chiara et al. 2020 and further references therein.
44 Compagnoni 1987.
45 Barker 2006, 175.
46 Tusa 1979.

Fig. 5a Perforated knives, Kalako-dherai, Late Bronze Age.

Fig. 5b Plowed paleosol (rice paddy field), Aligrama, Late Bronze Age.

Fig. 6a Domestic deposit of rotary querns from Barikot (BKG 11, Block D, Late Kushan phase).

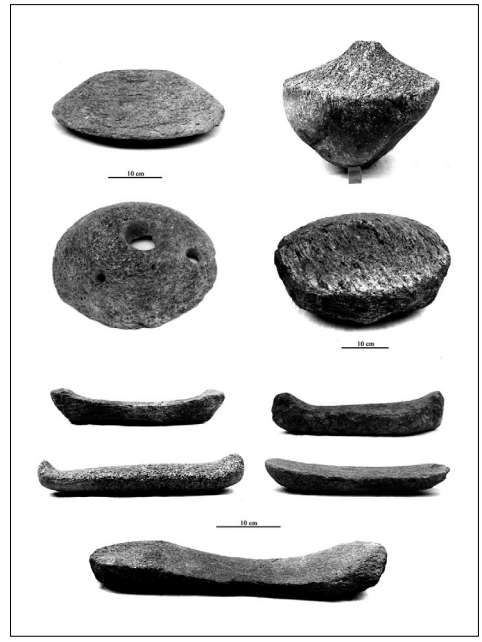


Fig. 6b Examples of saddle-shaped and rotary querns from Barikot (historic phases).

A later example of a plowed field dating to the beginning of the Common Era was documented at Udegram above the abandonment phases of a Late Bronze–Early Iron Age graveyard (SPG).[47] A related set of evidence constitutes the underground structures typical of Bronze Age rural settlements of Swat as well as Kashmir, the interpretations of which as dwellings should now, in most cases, be abandoned in favor of their use as granaries.[48] A final set of information, which aligns with the paleobotanic data, is linked to the significant production of wine in Swat attested by later wine-presses and earlier visual and literary evidence.[49]

Direct Evidence 4: Ceramics

Another body of evidence is constituted by the ceramics in use at the sites of Swat, especially two classes of large restricted vessels, the shape of which remained relatively stable from the Early Iron Age until the third century CE. In particular, we should consider here the pottery class CAc 2, red ware globular pots with everted [necks] rims found in both medium and large sizes (Fig. 7a). These vessels feature a gritty bottom and everted simple rims (or everted necks and simple rim). Often their rims are blackened by their use as cooking pots. The medium/coarse fabric and the gritty bottoms clearly speak of a cooking function. Chronologically, CAc 2 are typical from Indo-Greek to early Kushan phases (second century BCE to second century CE) but, in my view, belong to an early local pottery tradition cooking device with a very local long "shelf life." These large cooking or storage vases are documented in Late Bronze/Early Iron Age settlements sich as Aligrama and Loebanr III, and graveyards such as Udegram UDG and Gogdara 4. To cite the recently published volume on the pottery of Barikot, "the peculiarity of these vessels' association with Swat and surrounding valleys is certainly linked to their function, perhaps linked to local dietary or agricultural production. [...] these pots (with their peculiar restricted lower orifices) were perfect for cooking cereals rich in starch like rice (like the modern restricted-mouth *degg*s, *dohni*s and *gagar*s which are preferred for rice)."[50]

A second pottery class, CBa 2, includes large hole-mouthed jars (Fig. 7b). Hole-mouthed jars are typical of the earliest phases and tend to decline during the Kushan period before reappearing again in post-urban contexts, but with socketed rims for lids. The large mouth suggests the hypothesis that these large vessels were used to store dry

47 Vidale, Micheli, and Olivieri 2016, Fig. 54.
48 See Coningham and Sutherland 1997, with further references.
49 See Olivieri, Vidale, et al. 2006, 142–146; and Falk 2009. On this, see the recent Coloru, Olivieri, and Iori 2024.
50 Olivieri 2020d, 120.

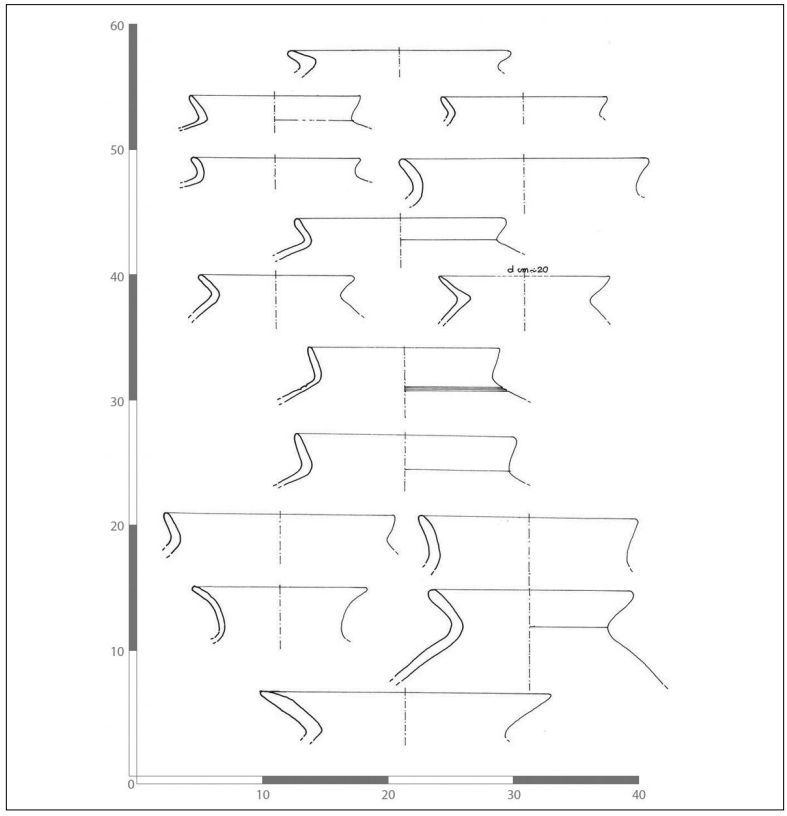


Fig. 7a Red ware globular pots with everted [necks] rims, pottery class CAc 2 (early historic to historic phases).

food. These vessels might have been used as domestic silos but could have functioned as specialized containers for the export of the cereals. The sizes of these hole-mouthed vessels remain fairly stable over time, and, although a complete form was never recovered, we can hypothesize that their dimensions correspond to quantity/weight units. We can here anticipate that the rice surplus from Swat was possibly exported to the major centers of the plain of Gandhara since protohistoric times, where agricultural production was weaker, while demographic concentration and demand were higher. The presence of these truly commercial vessels (whose earliest documentation occurs in the Achaemenid layers of Kandharar) in the "metropolises" of the plain is confirmed both at Taxila (Bhir Mound) and Pushkalavati (Charsadda).[51]

51 Olivieri 2020d, 120–121, with further references.

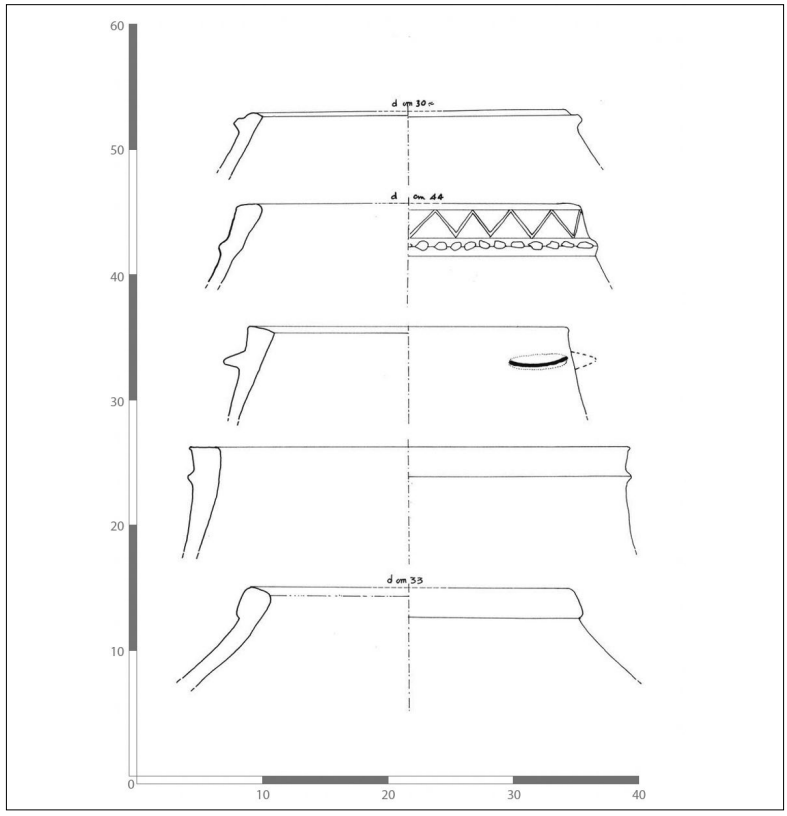


Fig. 7b Red ware hole-mouthed jars, pottery class CBa 2 (early historic to historic phases).

Indirect Evidence 1: Negative Interfaces

Besides revealing direct evidence, archaeological investigations also register negative data. In Swat, where a substantial continuity of human occupation has been documented, such long phases of missing evidence are particularly striking. Apparently, the most dramatic changes in the cultural features of ancient Swat are always marked by phases of abandonment, which have generally been interpreted as caused by natural events. This is the case for the period between the end of the Bronze Age (c. 1400 BCE; Macrophase 0 at Barikot) and the beginning of the Swat protohistoric graveyards (SPG) (c. 1200 BCE; Macrophase 1a at Barikot) (Interphase -*a*), as well as for the phase immediately after the end of the latter (Macrophase 1c at Barikot) before the beginning of the Initial Urban Phase (Macrophase 2a1 at Barikot)

(Interphase - *b*).[52] Around 800 BCE, SPG were abandoned. There is, thus, a gap of approximately 200 years documented throughout Swat but well evidenced at Barikot.[53]

As we will see below, another significant gap occurred between 500 and 600 CE (Macrophase 7 at Barikot; Interphase - *c*), which we have hypothesized may be explained by a climate crisis. Such a crisis may also account for earlier cases of major negative interfaces.[54] It is still too early to assess this, and we await the results of dedicated research on the topic that we have initiated this year (LASER CHIP Project, Ca' Foscari University of Venice; see *infra:* Conclusions). A final note: while we do not have genetic data for the Chalcolithic and Bronze Age, we know that from 1200 BCE until at least 1200 CE, Swat experienced a long phase of human DNA continuity.[55] Therefore, although the last two major events of crisis may have had demographic impacts, they did not change the genetics of people in the region.

Indirect Evidence 2: Land-use Conversion

The vast plots of land once used as burial grounds during the SPG phase later began to be converted for agricultural production.[56] It seems that inhumation, as a general practice, was progressively abandoned. This process of land reclamation (with its economic implications) was apparently gradual, judging from pockets of evidence of inhumation at Aligrama (a few occasional burials),[57] Saidu Sharif I (an isolated cemetery of the end of the fourth century BCE),[58] and Butkara IV (a single aristocratic mausoleum, c. 150 BCE–50 CE).[59] On the basis of the current data, the effective reuse of former land should have started around the mid-first millennium BCE, when a structured

52 The SPG chronology is firmly established between the brackets of 1200 and 800 BCE; see Narasinham et al. 2019, with further references. Regarding Interphase - *a*, LASER CHIP results are showing that the climate component may have played a significant role, as this phase of abandonment would have coincided with prolonged environmental conditions of severe drought at least between ~800 BCE and ~500 BCE.

53 Olivieri and Iori 2019. In Kashmir, archaeologists "have argued that despite this broadening of the agricultural package, the thinness of the archaeological deposits of the [700–200 BCE] phases, coupled with a declining diversity index of wood charcoal at the site indicates some form of population collapse during this period" (Spate 2019, 129).

54 For example, another early neo-glacial anomaly (ENA) may be responsible, like the one that occurred between 2500 and 1300 BCE, entailing intensified severe winter monsoons (Giosan et al. 2018).

55 The reader is referred to the data contained in Supplementary Materials of Narasinham et al. 2019; this issue was also briefly covered in Olivieri 2019.

56 See Olivieri, Vidale, et al. 2006, 131–135; Vidale, Micheli, and Olivieri 2011; Olivieri 2019.

57 Narasinham et al. 2019

58 Olivieri 2016.

59 Olivieri 2019.

globalized system of power was possibly established under the Achaemenids[60] and the so-called "second urbanization phase" (or Initial Urban Phase at Barikot) started in Swat, as well as in the north of the Subcontinent.

The improvement of agricultural production is, thus, also linked to the gradual diffusion of non-taphonomic burial rituals and—last but not least—to the expansion of the Buddhist communities.[61] Indeed, the outcome of the resulting agricultural intensification can also be seen as possibly the most significant achievement of the early Buddhists, and even one of the markers of their social success.

Indirect Evidence 3: Religious and Literary Sources

Finally, Swat is the region associated with the taming of the wild waters obtained through the conversion of the *nāga* Apalāla—tyrant of the waters and creator of famine and distress—by Buddha. Both legends look like they were once two sides of the same myth, embedded with deep agriculturalist symbolism. When we see the dams and the aqueducts around the ruins of the post-second-century-CE Buddhist monasteries in Swat, we cannot help but imagine that, starting from the Kushan period, the irrigation managed by the monks was nothing more than the conversion of Apalāla redux on economic scale, which can be considered the "covenant" moment of Buddhism in Swat,[62] as well as in Kashmir.[63]

The importance of Swat for its agricultural production is well attested in literary sources, encompassing the first-hand accounts available to Alexander's historians; the early Buddhist texts, including Chinese sources (Song Yun, Xuanzang), ending with the *Bāburnāma;* the slightly later *Swātnāma;* and the British colonial reports and gazetteers.[64] Double-crop production was so important in Swat that the great Norwegian ethnographer F. Barth built on it in one of his most seminal studies on

60 I like the extended definition of analogous features given by Spate 2019, 12: "vertical complexity and state building" and "a time of major institutional realignment, with an expansion of bureaucracy, intensification of public works."

61 Olivieri, Vidale, et al. 2006; Olivieri 2019.

62 Salomon 2019, 33. A reasonable etymology of the Sanskrit name Apalāla is "without straw, sprout." The extraordinary importance of this theme (the binomial water; magic or flood; *nāga* deities) is demonstrated by its survival in Pashtun folklore (see See Inayat-ur-Rahman 1968, Tale 16; Tale 25. The first tale is set in Barikot and features the king and magician Upāla, the jogi Padmānī, and the goddess-serpent Kupal as protagonists. The king's palace-fortress was located on the hill of Barikot).

63 Tucci 1958, 282, n. 18. On this, see again Olivieri, Vidale, et al. 2006.

64 See Olivieri and Iori 2022. Chinese sources, in particular the *Luoyang Qielan ji* (sixth century CE), confirm the exceptional agricultural richness of the Swat valley [Udyāna] (see Kuwayama 2006, 65–66). The agricultural wealth of Swat in the seventeenth century is described in the *Swātnāma*

the Swat Pashtuns. He interpreted the diachronic territorial expansion of the Pashtun groups as a movement of gradual acquisition of double-cropping areas throughout four centuries.[65]

Early-historic Data

Overall, the above data represent the foundations on which we can confidently build—as Barth did from his data—a possible interpretative model of Swat's role in food production, both for itself and its neighbors, over the millennia. In order to keep the flow of the following text clear, citations will hereafter be limited to footnotes referencing mainly pieces of scholarship that have not yet been cited above.

Proto-urban Patterns of the Iron Age

Our knowledge of the cultural history of Swat improved exponentially in recent years, when the excavations at Barikot revealed a structural and stratigraphic sequence that details the entire life of the city from the Proto-Urban levels to c. 300 CE in the lower city and to c. 1400 CE on the acropolis (Fig. 8). The city was known to Alexander's historians as Bazira or Beira, and as Vajrasthāna in a later Indian epigraphic source.[66]

In the Early Iron Age phase, the farm site settlements of Aligrama and Barikot had articulated layouts: clusters of permanent structures, extensive graveyards, and, at Barikot specifically, inner citadels. Here, the settlement (larger than the future urban establishment, at fifteen to twenty hectares) was built around an inner stronghold revealed by a stretch of a large earthen rampart preserved at a height of up to 1.23 m, with a visible width of more than 5 m. The latest phases of the rampart are radiocarbon-dated to 1100–1000 BCE.[67] The associated material belongs to a shared regional pottery tradition, diffused from the highlands to the plains, including Gandhara proper (Charsadda) and the trans-Indus (Taxila).

of Kushal Khan Khattak (Sultan-i-Rome 2014, 115). On Swat in the eighteenth and ninteenth centuries, see Stacul 1987, 9–11.

65 Barth 1956. See also Paine 1982 for further references.

66 See, respectively, Baums 2019 and von Hinüber 2020.

67 See Olivieri and Iori 2020 in addition to Olivieri et al. 2019.

Fig. 8 Plan illustrating the archaeological trenches excavated at Barikot (updated winter 2024) (in red: refilled trenches).

The Initial Urban Phase and the "Gandharan Optimum"

The collapse of Swat's regional cultural material identity in circa 800 BCE is followed—after a significant gap, as we have seen—by a sudden re-expansion of the archaeological evidence in the sixth to fifth centuries. From this point onwards, we have documented all the markers of a true urbanization at Barikot as well as the presence of Iranic and Indo-Gangetic pottery forms.[68]

The latter evidence suggests that the foundation of a city at Barikot occurred in a moment of climatic optimum associated with a growth of trans-regional trade.[69] That moment, thanks to radiocarbon dates, can be associated to the phase of Swat's

68 Olivieri and Iori 2020; Olivieri et al. 2019; Coloru 2021.

69 Preliminary results of the LASER CHIP project observe an abrupt transition to a wetter environment, mainly due to increased summer monsoon activity, at least since 50 BCE. This factor, together with the climatic and morphological preconditions of Swat, certainly led to a further intensification of agricultural production, making Swat even more relevant in the regional resource supply system.

integration into the Achaemenid imperial network. Aside from in Barikot, the early stages and further development of this initial urban phase find analogies in other sites in Swat as well as in the plains at Taxila and Charsadda/Pushkalavati. In this phase, the augmented agricultural production was perhaps exploited by a more structured system of power (in this case, the Achaemenid system). This is possibly the moment when Swat came to be organized as a true agrarian colony.

In fact, although the economic implications of double-cropping were clearly perceivable already before the formation of early cities at the end of the second millennium BCE, it was after 500 BC that we see the protohistoric farm site being transformed into a wealthy city. According to preliminary data from our paleoclimatic studies, the urbanization phenomenon of the mid-first millennium can be linked in Gandhara to the beginning of a long phase of climatic optimum (which our Barikot research team called "Gandharan optimum") that lasted more or less steadily until the third century CE.

We can catch hints of Swat's political autonomy in several references scattered throughout historical and epigraphic sources. That, in Alexander's time, Swat was already semiautonomous (albeit within the framework of the Achaemenid system) is suggested by the figure of a Sisikottos, relative of Assakenos, king of Swat (a king, not a satrapal governor) who performs ministerial service roles alongside Bessos in Bactria and then goes on to serve Alexander and guide him to Swat.[70] Swat's autonomous status, which derived from the management of agricultural surplus resources, was maintained at least until the end of the first century CE.[71] The inscription of Senavarma (c. 70 CE), the last king of the Oḍiraja with his wish for the dynasty to last a thousand years, clearly tells us of a situation of happy autonomy if certainly not total independence, given Senavarma's own polite appeal to Kujula Kadphises' son. According to a recent hypothesis, land ownership is still firmly in the hands of the aristocracy at this stage.[72] Events following the final Kushan seizure of power in Swat (occurring perhaps with Vima Takhto, who is the first Kushan king whose coins we frequently find) highlight from around the very early years of the second century the colonization of the rich countryside by large monastic foundations and the simultaneous disappearance of the Oḍiraja and of the gentry elites from the epigraphic record.

70 Arrian *Anabasis*, IV 30, 4; Coloru 2021, 70.
71 See Olivieri 2022b, with references.
72 Again, Olivieri 2022b, 71–72.

The Mature Urban Phase

As we know from Arrian, in Swat Alexander "built fortresses at Ora and Massaga for the defense of the region, and fortified the city of Bazira" (Arr. *Anabasis* [*Anab.*] 4. 28. 4). Two centuries later, the Indo-Greeks built a new, massive stone-masonry defense around the city, which was reinforced at the beginning of our era, during the Saka-Parthian cultural phase.[73] On the basis of the new data, the Indo-Greek fortification at Barikot (coeval with the foundation of the new Pushkalavati at Shaikhan-dheri) are both to be dated to the second half of the second century BCE, most probably towards the reign of Antialkidas (Macrophase 3a at Barikot).[74]

During the Kushan historical phases (Barikot Macrophases 45a), the city saw a gradual expansion of the built-up area and the abandonment of military fortifications, at a time when Gandhara and particularly Swat found themselves in a long period of peace at the center of a larger metropolitan territory.[75] Many years ago, I proposed a thesis that reads the abandonment of the walls as a direct effect of the *pax kusanica*.[76] Today, I would be inclined to propose an alternative but concomitant reason to explain the demilitarization of the city. The dismantling of the defensive walls of the city of Barikot can be interpreted, directly or indirectly, as signaling the disempowerment of the landed aristocracy, with the concomitant transfer of power to the monastic communities. The thesis proposed here is that the city walls were demolished (or, at any rate, not rebuilt) as a deliberate sign of the handover of the reins of economic administration—which involved the collection of taxes and the management of agricultural deposits—from the landed nobility (the urban elite) to the Buddhist monasteries.

Whatever was the reason for this pivotal event in the structural history of the city, the city continued to carry on its life as a center of aggregation, while many residential quarters of the city from the end of the second century also began to be transformed into monastic areas or urban monasteries, perhaps in some cases run by women's communities.[77]

The city was abandoned during the Kushano-Sasanian rule in the early fourth century CE (Macrophase 5b in Barikot).[78] Ample traces of two major earthquakes have been documented in this last century of life at the city at Barikot (Macrophase 6 at Barikot). This crisis of urbanism in Gandhara and Swat is confirmed in practically all

73 See Olivieri 2015c; Iori, Olivieri, and Afridi 2016; Coloru, Iori, and Olivieri 2021.
74 See Olivieri and Iori 2020.
75 In fact, once Bactria was lost during the reign of the first Sasanian king, Ardashir I, Swat and Gandhara lost their strategic depth and were soon occupied by Ardashir's son, Shapur I.
76 In Olivieri 1996.
77 Iori 2023b.
78 Olivieri 2015c; 2017; Olivieri and Filigenzi 2018; Iori and Olivieri 2019.

urban centers in and around Gandhara (from Begram to Barikot, Udegram, Barama, Charsadda/Shaikhan-dheri, and Sirkap) and certainly involved drastic social changes. Perhaps this crisis cannot be associated with the end of the "Gandharan optimum."[79] In fact, since the agricultural economy had long been in the hands of the monasteries, in Swat the economic impact of the city's crisis was not as noticeable as one would have expected (see below).

A Climatic History

...Business as Usual

In fact, despite the urban crisis of the late third century CE, the "business" of agricultural production continued as usual. This is because agricultural production was firmly in the hands of Buddhist monasteries already from the beginning of the second century CE. After all, these monasteries constituted the only local actors possessing staff, organization, and infrastructure, run by expert administrators of high ethical reputation with writing and computing skills.[80] Through royal and private donations, Buddhist monasteries must have had accumulated large estates where they built hydraulic infrastructure such as dams, aqueducts and pit-wells, which are still visible today. Land might have been administered by means of a joint system: tenancy in the high pastures and forestry pools, and crop-sharing in the lowlands. If the first system is possibly indicated by the existence of non-Buddhist semi-nomadic tribes in the mountains,[81] the second is documented by the existence of structured farm villages and agricultural terraces along the alluvial land at the foot of the rich Buddhist monasteries. Significantly, the system of administering land remained functional for at least two centuries after the collapse of the urban system. The crisis, as we will see, might have been triggered by an unpredictable climatic event rather than political or structural change.[82]

79 According to climate data from the LASER CHIP project, the urban crisis that followed the third century CE was in no way related to climate variability.
80 Iori 2023c with references.
81 Discussed in Olivieri 2015b.
82 See Olivieri 2017a; Olivieri and Filigenzi 2018.

The Late Ancient Crisis

However, this system of land management and production stopped working a few centuries later. At this point, according to Xuanzang's testimony, Buddhism in Swat experienced a significant decline around the sixth century CE. The decline was not limited to religious or doctrinal aspects but apparently involved the entire social and economic life of the region. In fact, Chinese sources and diplomatic annals clearly exclude Swat from their descriptions of the main trade routes after 538 CE. Xuanzang, the first Chinese visitor who came to Swat (a century later), found the situation of the economy and Buddhist complexes dramatically compromised. In Xuanzang's words, this fact is also associated with the concomitant collapse of the agricultural production system. This fact, in my opinion, must have been an important turning point in the economic history of the valley. In reference to the accounts of Chinese Buddhist pilgrims, Tucci already succinctly pointed to the scope of this process decades ago: "It is not easy to explain the decrease of monasteries after Fa-hsien [Faxian] (399–414 A.D.) (1,400 monasteries) and the fact that at the times of Hsüan-tsang [Xuanzang] (he travels from 629 to 645) many of them were in ruins [...]. Sung Yun [Song Yun] (he travels from 518 to 523) speaks in high terms of the Buddhist community and does not anticipate the different statements of Hsüan-tsang. 1,400 monasteries imply not only a widespread devotion, but also a great wealth necessary for their maintenance."[83]

This process of decline is reflected archaeologically, as there is a striking gap of evidence during the late sixth to early seventh centuries CE in Swat (Macrophase 7 at Barikot). Interestingly, a similar gap between major archaeological phases is recorded in almost all stratigraphically investigated sites to the west of the Khyber Pass, from Ghazni to Kapisa: Tapa Sardar I and II, Begram II and III, and Tapa Skandar I and II. One of S. Kuwayama's most concise and important contributions on the latter sites is dedicated precisely to this problem.[84]

However, it is worth noting that the crisis is more evident in the central stretch of Middle Swat. In fact, in the seventh to eighth centuries CE, late Buddhist pilgrimage centers in the side valleys of Middle Swat and around the center of Manglawar began to be renovated with addition of rock sculptures.[85] This confirms what Tucci documented through Chinese and Tibetan sources, i.e., that in the seventh century, "Swat was split into two political entities: one ruled by the Buddhist king Indrabhūti

83 Tucci 1977, 67.
84 Kuwayama 2010.
85 The reference study for these data is Filigenzi 2015.

(protector of the late Buddhist schools),[86] while the other was politically dependent on the [Turki Shahi] Laghman-Kabul area."[87]

The Causes

How this process of decline should be explained is less clear. Tucci suggested that "[...] something had, then, happened [in Swat] between the visit [of Song Yun and Xuanzang]. I suppose the cause may be attributed to natural calamities and social unrest [...]."[88] Verardi was even more explicit, stating that it was not possible to "believe that the change [...] took place without any violence."[89]

A provocative alternative hypothesis has more recently been generated through discussion with other colleagues, including Nicola Di Cosmo of the Institute of Advanced Studies, Princeton, in reference to the so-called "late antique Little Ice Age" (LALIA), a long cooling period occurring between 536 and 660 CE. Namely, it may be possible that the collapse of agricultural production in Swat was instigated by the effects of the LALIA. In a similar fashion, scholarly studies have already attributed other regional collapses of imperial organizations, dramatic exoduses of populations across Eurasia, and even the Plague of Justinian to the LALIA.[90] Indeed, new research is showing that the effects of the LALIA have significant regional variations, especially in peninsular South Asia: "A significant link between cooling and social disruption is demonstrated, but it is also demonstrated that the link is highly variable, with some societies experiencing dramatic cooling changing very little, and others experiencing only slight cooling changing dramatically."[91]

In respect to Swat, it is, therefore, probably still too early to advance a comparatively structured hypothesis to explain the collapse of agricultural production. However, it will be important to obtain positive data to fully understand the impact of the LALIA along the piedmont of the Hindu Kush. I hope that, with new paleoclimatic data from Swat, the LALIA working hypothesis can open new perspectives on the impact of climate

86 As related by a thirteenth-century Tibetan tradition; see further Tucci 1940; Olivieri 2017b. In various loci of the Tibetan tradition, it is recorded that Padmasambhava, the great *sadhu* known as Guru Rimpoche, born in Swat and raised by Indhrabhuti, was an expert in irrigation techniques (both physical and metaphysical).
87 Olivieri 2010, 360–361.
88 Tucci 1977, 67–68.
89 Verardi 2011, 172.
90 Büntgen et al. 2016; see also Whittow 2019, 361–363.
91 From the abstract of Peregrine 2020.

change on the ancient economy of the Himalayan double-crop pocket zones.[92] For example, perhaps this phenomenon can help to explain the rapid growth of mountain princely states presiding over agricultural economies that were already adapted to low temperatures, such as the kingdoms of Bamiyan and the Palola Shahi at Bolor-Chilas.

However, when Xuanzang visited Swat, a new element had emerged in Swat's cultural environment: the *deva*, or Brahmanical temples. Indeed, as Tucci spoke of possible "social unrest," and Verardi of "violence," there was certainly a breakdown of the social status quo. But that breakdown may be related to the crumbling prestige of Buddhist elites following sudden climatic cooling, and the concomitant collapse of agricultural production.

Ultimately, this agricultural and climatic crisis was symbolically lethal for Buddhist elites. The climate drama—alongside its impact on the material life of the population—most likely had a metaphysical impact on the perceived capacity of Buddhist elites to deal with elemental forces (such as the powerful *nāgas* who first opposed Buddhism in the valley). Xuanzang describes a doctrinal shift in the attitude of Buddhist monks towards magic and exorcisms. Could this reflect their plummeting metaphysical reputation? Let us focus on just one single episode of the long anti-Buddhist process, which occurred in a post-Kushan chronological moment of the history of Kashmir. Specifically, in the Rājatarangiṇī (I 181), it is conveyed that the Brahmans, not Buddhists, were able to please the *nāgas* who were responsible for heavy snowfalls that were causing destruction.

In a situation of climatic distress and the collapse of agricultural production, it is possible that the Buddhist legitimacy (i.e., the Apalāla's covenant episode) might have been shaken, possibly creating the conditions for a radical power shift. Although others have explored potential conflict between the Buddhist elite and landed gentry with respect to the possession and management of agrarian resources in northern India,[93] in my view it is premature to introduce a parallel situation in the case of Swat.

In any case, archaeology attests to the construction of *deva* temples within such a context of social and economic flux, including the example on the acropolis of Barikot. This temple was built in the early Turki Shahi period (end of the seventh century CE; Macrophase 8a at Barikot), directly on top of the demolished structures of a magnificent Buddhist sacred area (Fig. 9). [94]

92 Despite the significant amount of data, the LASER CHIP project failed to capture an environmental archive covering the occurrence of the most recent interphase (between 500 CE and 700 CE). The study is ongoing with new sampling, the analyses of which will be released during 2025–2026.

93 On this, see Bronkhorst 2007, 251–252; Verardi 2011.

94 Here, excavations are in progress. For now, see Callieri, Colliva, and Nasir 1999–2000; Callieri et al. 2000. See also Olivieri 2022c; 2022d.

Fig. 9 The *deva* temple on the acropolis of Barikot constructed directly over a demolished Buddhist sacred area.

Conclusions

With these concluding remarks, I return to the question of the importance of the phenomenon of archaeological negative interfaces represented by absences of activity (interphases), as highlighted in the Introduction. When this contribution was conceived for the 2019 Freiburg conference, we were moving into the realm of hypothetical answers to a framework of questions that field archaeology gave as well established, and that concerned the agricultural and settlement climatic exceptionalism of the Swat Valley economic space and its oscillations between its phases of occupation and interphases of abandonment.

Today, we are one step closer still to providing well-founded answers to the following set of questions specifically:

1) the issue of double-crop agricultural economy and its relevance in the system of exchanges between productive and consuming areas, i.e., between center and periphery in polycentric or highly centralized systems of power;

2) the importance of agricultural intensification as a driving element for urban expansion in historical phases;

3) the diagnostic relevance of archaeological interfaces for the interpretation of historical phases in areas characterized by favorable conditions and demographic and anthropic–cultural continuity;

4) the importance of paleoclimatic studies for understanding interphase phenomena and, thus, the possibility of experimentally tracing, through recognizable patterns, human response or resilience to global phenomena of natural origin. As paraphrased in the title of a very important recent collection of essays, we can test the possibility of tracking historical phenomena through the form of natural experiments.[95]

Most of these answers are based on the initial results of the LASER CHIP project (Late Antique Swat Ecology and Resilience: Climate and Habitat in Interfacial Periods) launched by the Ca' Foscari University of Venice in 2021 in collaboration with the Italian Archaeological Mission, which is beginning to yield its results.[96] The new project carried out a series of three core drillings in 2021 at the Barikot site on a sequence that is chronometrically stable between the present and 20,000 BP, thus covering the entire sedimentological and anthropogenic sequence of the post-glacial phase site and spanning the entire Late Pleistocene to Holocene and Anthropocene of the Swat Valley. Analysis of inorganic elements, organic biomarkers, and stable isotopes of soil/sediment deposits, together with structural analysis of archaeological material, is producing a new model for reconstructing economic processes through the entire ancient age. At present, it is too early to give the details of these results; what has been anticipated in this contribution, however, is that the analyses have revealed dramatic climatic fluctuations, with transitions from cold-arid to warm-humid phases, then from periods of climatic and environmental stress to truly long phases of climatic optimum. Just as the latter coincide with phases of urbanization and agricultural intensification (which also entail the inclusion of economically and culturally revolutionary new crops, such as cotton), the former periods of stress significantly seem to coincide—at least in one case—with such interphases, or periods of anthropogenic stasis, which this study began by highlighting.

95 Diamond and Robinson 2010.

96 Which will soon be available in a publication that I am preparing with Dario Battistel, Robert Spengler, Rita Dal Martello, Claudio Faccenna, Giuditta Fellin and their team, Stefan Baums, Omar Coloru, Elisa Iori, and Michele Minardi—a paleoclimatologist, two paleobotanists, a team of geologists, a philologist, a historian, and two archaeologists—with a focus on the early urbanization phases of Swat.

Figure Credits

Chart 1 By Luca M. Olivieri
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Fig. 7a+b Drawings by Francesco Martore/ISMEO
Fig. 8 Elaborated by Luca M. Olivieri/ISMEO
Fig. 9 Photo by Luca M. Olivieri/ISMEO

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