The Deblin(sko)-locality: physical landscape

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Abstract: In the frame of international project LENSUS the Deblín-locality served as a pilot area for sustainability education. The project also included physical landscape study based on analysis of cartographical data sources and field survey. We succeeded in the construction of composite physico-geographical spatial units using intensive research methods and concerned on studying materiality of physical landscape spatial units. As well as intensive social research provided remarkable results in university-basic school-families cooperation when the households expressed deep interest in the topic of sustainability and community is still living with project. (Grand)parents were surprised by the practices of the project and welcome the results for their living.

Key words: physical landscape, components and composite spatial units, materiality, intensive study

INTRODUCTION

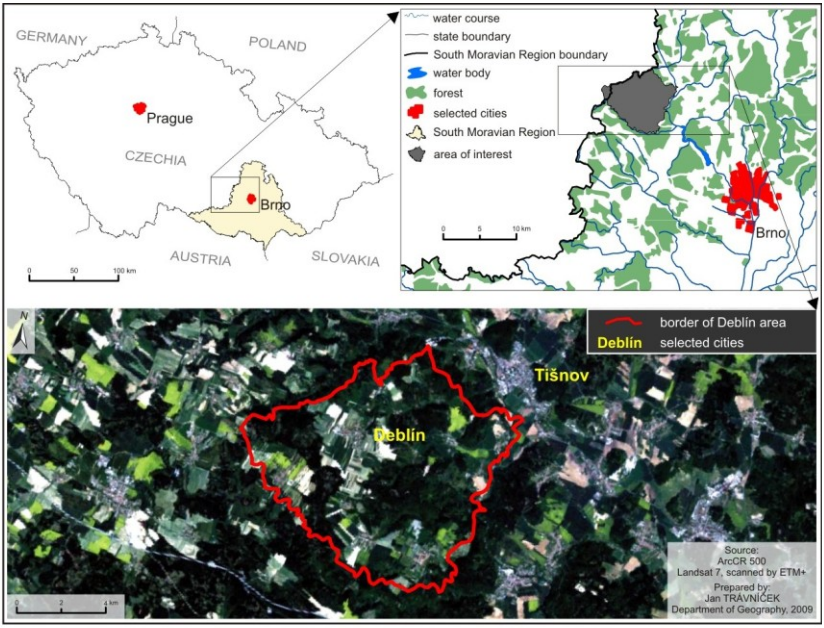
Physical landscape is an evergreen topic in tradition of continental geography. Not so in the Anglo-Saxon tradition. As WYLIE (2007, 8, 14) mentions, landscape is a ways of seeing and he splits landscape into ´material and mental aspects, objective and subjective, science and art, nature and culture´. For my Dept. of Geography a landscape has been involved in physical geography since 1973 and linked with ecology/environmental studies. Since 1982 when IALE (International Association of Landscape Ecology) has been established in Slovakia (the author was one of co-founders) it is landscape ecology – a transdisciplinary approach to landscape as a set of landscape ecosystems that plays the key role also in applications. Physical geography is a starting point to physical landscape study including all material component – landforms/lithology, climate, hydro-cycle, soil cover, biocenoses and their composite spatial units, assemblages in the sense of DELEUZE & GUATTARI (1987,2009). An ecosystem concept creates the main part of another project – sustainability. We accept it with respect to Millennium Ecosystem Assessment

(ALCAMO et al., 2003). An ecosystem is understood as capital, providing services tu humus and also other ecosytems.

Landscape, including physical one, is a form of spatiality intended to humans/nature interactions, in the case of physical landscape the interactions between physical components of it (HYNEK 2009).

The Deblin-locality, from a geomorphological point of view, is a remnant of faulted dome with contemporary shape of ´horseshoe´ – an elevation with its base at 240 m above sea level and the summit at 540 m a.s.l. It is comprised of a very wide collection of metamorphic and sedimentary rocks covered with earth/slope sediments and soil cover consisting of cambisols, (para)luvisols, pseudogleys and leptosols. The topoclimate is mildly warm and moist with sunny and shady spots. At the foot of the dome five streams can be seen flowing around it with average discharge up to 8 $m^3.s^{-1}$. Their autochthonous tributaries from the Deblin dome are strongly influenced by the dissected terrain. The former *Ulmi fraxineta carpini, Carpini querceta, Fagi querceta + typica* and *Querci fageta* were almost de/reterritorialized into cultural forests, cultivated fields, orchards, meadows and villages/country town settlements. It includes 9 municipalities with 3,156 inhabitants in an area of 56.8 km^2 as a part of the town region of Tisnov, a marginal suburban town of Brno. Deblin is a part of Tisnov-region (Tisnov-town population: 8,704 inhabitants) and the city of Brno (population: 404,067 inhabitants). Large-scale agriculture (since the 1950s) and Saxon-type forestry (since the 1750s) strongly influenced rural landscaping, causing biodiversity depletion, a monotonous landscape character, accelerated anthropogenous soil erosion and run-off with impacts on the human environment (HYNEK A. et al., 2010).

Fig.2: The Deblin/locality –location.



Source: HYNEK et al., 2010.

METHODOLOGY

Geographical study of physical landscape is zooming its attention on spatiality of its components using data from non-geographical disciplines and its field/study - mapping spatial units, as far as possible at the local/topic level , molecular in the sense of DELEUZE & GUATTARI (2009, 229). There is very instructive concept of physical landscape study presented by PREOBRAZHENSKIY, 1984:

Fig.2: Mono/polysystems models of landscape.

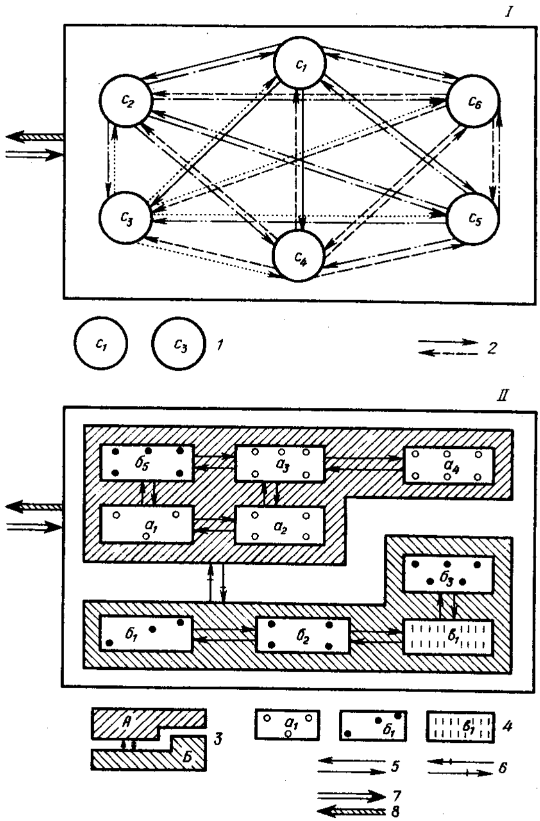


Fig.1. MODELS - CONCEPTIONS OF A LANDSCAPE (After Preobrazhenskiy, 1967)
I - monosystems model, II - polysystems model.
1 - components; 2 - relation of components; 3 - geosystems of "n" rank; 4 - geosystems of "n-1" rank; 5 - relation of geosystems of "n-1" rank; 6 - relation of geosystems of "n" rank; 7, 8 - relations with environment.

Source: PREOBRAZHENSKIY, 1984, 18.

Another up-to-date unsurpassed performance in landscape ecological mapping comes from HAASE (1984).

I agree with KOLEJKA (2011) who is strongly critisizing contemporary declined state of the Czech landscape study based on mechanistic manipulation with uncontrolled data though processed in advanced GIS technologies however without understanding landscape reality. It could be add: landscape materiality. In this context we can follow new (critical) materialisms studies, e.g. COOLE and FROST (eds. 2010), BENNETT (2010), BRYANT, SRNICEK and HARMAN (2011). The materiality studies are also based on intensive research methods. We must not forget the ecological materiality of the cities (HEYNEN,KAIKA,SWYNGEDOUW 2006) and non-representational approaches in geography, opened by N. Thrift, the latest from ANDERSON and HARRISON (2010).

In the hands of advised specialist on GIS technologies, in the case of Deblin-locality it is PhD. student Jan Travnicek we jointly produced all the series of thematic maps covering physical landscape using critically the sources of various institutions starting with the scale 1:10,000 up to 1:50,000. This locality has its own thematic atlas! Not only maps of physical landscapes but also human/cultural geography ones (TROJAN and TRAVNICEK, 2011)

PHYSICAL LANDSCAPE COMPONENTS

Landforms

New development in the Czech geology offered more precise knowledge for study of landforms, different from contemporary views in the Czech geomorphology. It is a monograph of CHÁB et al. (2008) providing new spatiality of morphostructures in the Czech Massif, very welcome contribution for intensive study of landforms. Prevailing orientation of the Czech geomorphology on relief genesis has been changed here in favour for relief/terrain as factor influencing other physical components and human decisions (transport, construction, agriculture, recreation, etc.). Relief/terrain is in that case interpreted as translator of matter/energy flows (DYAKONOV, 1975). Very speculative debate on planation surfaces was omitted and more effort was paid to landforms applying approach of SPIRIDONOV (1975, 7) who recognized elementary surfaces a lines on landform bodies and eventually their groups.

We cannot forget the treatise of HRÁDEK (2000) and thesis of KUBALÍKOVÁ (2005) who contributed to terrain analysis, e.g. tectonic forms, karst, gully erosion, etc. We continued in identification of landforms as valleys (slopes, bottoms and edges), gorges, ridges, troughs, hills, step faults, (inclined) plains, terraces, basins, dells. These landforms are physical bodies covered with soils, vegetation, exposure to sun-rays, specific run-off, anabatic/katabatic winds. It is very important i physical landscape study. I must strongly evaluate the cartographic and GIS assistance of J.Trávníček who helped me with terrain morfology on his excellent thematic maps.

Topoclimate

Less known in landscape practices, more frequent term is mesoclimate in the sense of Czech geographer E.QUITT. But he was also very active in local climate studies, he is the author of Topoclimatic map in the scale 1:50,000 covering 80% of the Deblin-locality. His topoclimatic analysis includes next attributes for the upper part of the Deblin-locality, QUITT (1994, 52):

Topoclimate of Highlands

19 - topoclimate of peak parts distinctly protruding above the surroundings, 20 - topoclimate of convex formations merging with the surroundings (peak plane), 21 - ditto with the low loose housing, 22 - topoclimate of slopes under very good solar irradiation, 23 - ditto with a possibility of pronounced catabatic flow, 24 - topoclimate of slopes under normal solar irradiation, 25 - ditto with the low loose housing, 26 - ditto with a possibility of pronounced catabatic flow, 27 - topoclimate of slopes under minor solar irradiation, 28 - ditto with a possibility of pronounced catabatic flow, 29 - topoclimate of deeply incised valleys, 30 - ditto with the low loose housing, 31 - topoclimate of indented formations with pronounced local temperature inversions, 32 - ditto with the low loose housing, 33 - topoclimate of indented formations with less pronounced local temperature inversions, 34 - ditto with the low loose housing.

We completed this sheeet and The Atlas of Deblin-locality is including in it, spatial data are also in the Table 1.

Hydro-cycle

Water balance of Deblin-locality abounds in contrasts: summit planation surface is relatively dry, especially in vegetation season whereas on the margin border we can find watercourses with dominant the Svratka-river. Its discharge reaches average value $8m^3.s^{-1}$, centenial: $365m^3.s^{-1}$, the output from Deblin-locality into the Svratka-river is about 3 litres $.km^{-2}.s^{-1}$. The tributaries of the Svratka-river create in ground plan ´a wheel round the island´. The reason of relative drought of water balance is in the very thin layers of regolith covering basement crystalline rocks with limited retention od ground water. The water retention of ground crystalline rock is also very limited for deficiency in pores. We can describe the run-off process as accelerated, especially in deforested areas. However this process could be mitigated by collecting precipitation, not only rains but snow, too. If you have a roof with the surface of 10x10 metres and annual precipitation reaches 500 mm, you have almost $50m^3$ of water at disposal.

Soil cover

Traditional account of soils, very common not only in geography, can hardly be a real spatiality of soil cover including all soil taxons. We prefer the concept of FRIDLAND (1972,1975) who developer ´the structure of soil cover´ . Accepting his ideas we submit the solution for Deblin-locality:

RANKER
lithic variations
catenas: ranker- colluvisol-lithosol

tachets: ranker-cambisol
RENDZINA
contrast mosaics: rendzina-lithosol-ranker-pararendzina
PARARENDZINA
contrast mosaics: pararendzina-rendzina-lithosol-ranker
FLUVISOL
palletes/spottinesses: fluvisol-gleysol
PARALUVISOL/ LESSIVÉS-PARABRAUNERDE
palletes/spottinesses: paraluvisol -luvisol-pseudogleysol
mosaics: hnědozem-kambizem
LUVISOL
palletes/spottinesses: luvisol-paraluvisol-pseudogleysol
CAMBISOL
catenas: cambisol-ranker-litozem
mosaics: cambisol-paraluvisol-luvisol
PSEUDOGLEYSOL
palletes/spottinesses: pseudogleysol-luvisol-paraluvisol
GLEYSOL
palletes/spottinesses: gleysol- fluvisol

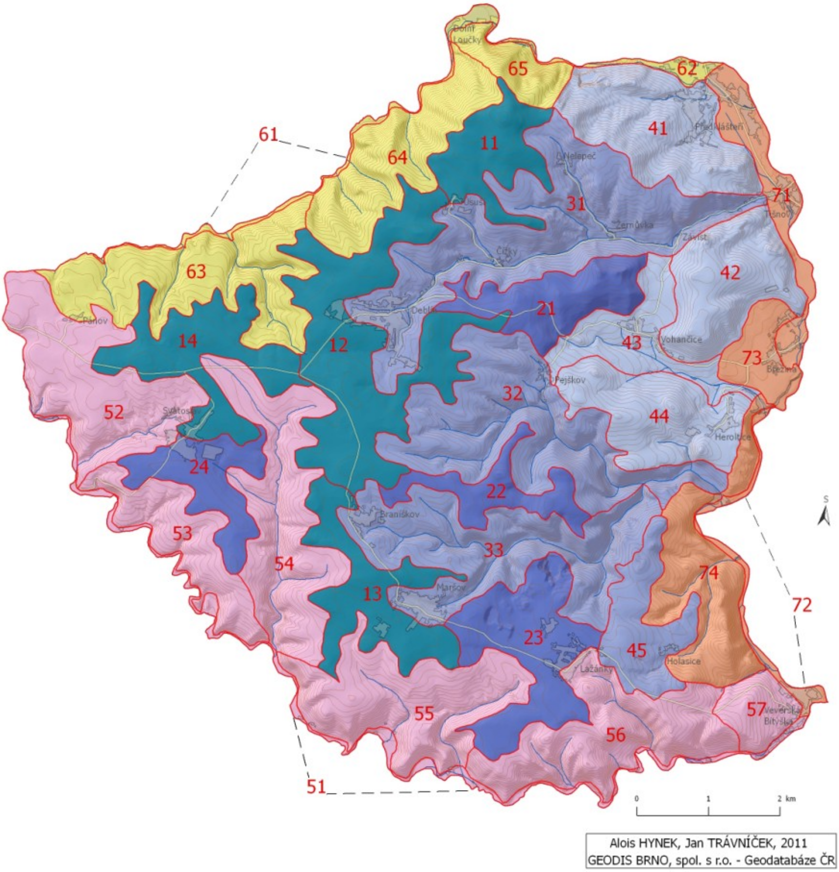
Phytogeocenoses

Contemporary cultural landscapes are modifications of former physical ones transformed by humans. It is a serious problem to reconstruct the former vegetation before human impact, especially after process of deforestation. We also recognize potential vegetation – contemporary one in the case of absenting human impact. There is an option of realist approach using vast collection of data in the Czech forestry. The state has its own institution : The Institute of forests econonomic management (IFEM/ÚHÚL) in Brandýs n.L.-town. Searching for economically optimal composition of trees in the forest plantations edaphic conditions play the main role. The specialists do survey for edatops identification in the scale 1:10,000 and they have experience with choice of trees composition intended for edatops. For that reason their thematic maps present very advanced data for reconstruction of potential vegetation in the terms of phytogeocenoses. They are applied for the forested landscape of Deblín-locality (see Table 1)

PHYSICAL LANDSCAPE COMPOSITE SPATIAL UNITS

While in Slovak physical geography is complex physical geography quite common matter, Czech physical geography is very traditional, conservative in this topic. Not so Polish, German, Hungarian physical geographies. There are various systems of taxonomic physico-geographical complex/composite spatial units, we prefer as elementary unit the top and their groups –polytops associated in monomicrochores. The German equivalent for polytops is nanochore, Russian – facija (фация) eventually microchore/урочище.

Fig.3: Physical landscape monomicrochores in Deblín-locality.



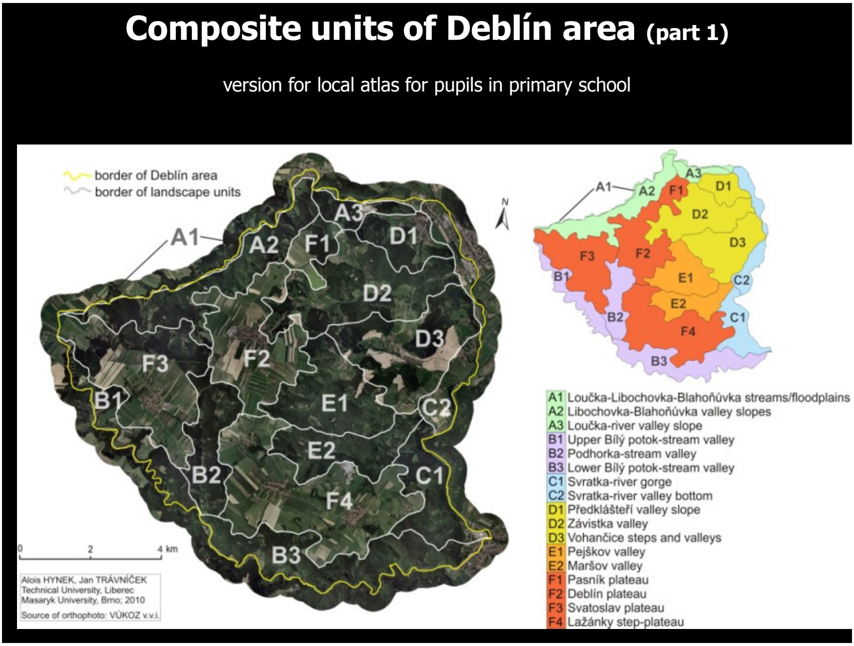
Source: HYNEK,TRÁVNÍČEK, in SVOZIL,HYNEK, eds. 2011.

Legend:

1 – upper horseshoe plateau rim, 2 – inner middle ridges with scattered karst, 3 – trough valleys, 4 - lower plateau/steps/terraces/hills/basin with scattered karst, 5 – the Bílý potok-stream valley, 6 – Blahoňůvka/Libochovka/Loučka stress valleys, 7 – the Svratka-river valley

Another variant:

Fig.4: Physical landscape spatial units of Deblín-locality.



Source: HYNEK et al., 2010

And more detailed table:

Table 1: Physical landscape composite units in Deblin-locality.

Composite units of Deblín area (part 2)

	LF	RE	TC	HC	SC	SC	PV	AV	LU image	LU
A1		f LSG	💧 ✳	D 0.3 2.1		F G	Ufc	meadows woods ruderal		forestry recreation
A2		d GnGrPh	💧 ✳	SR 3-5		L C M	Ft-bsakd	forests		forestry recreation
A3		d GnGr	💧 ✳	D 1.52		L C M	QF-js FQ-b	forests ruderal		forestry quarry
B1		d GnPh	💧 ✳	D 0.15		L C F	QF-sk FQ-kas	forests ruderal		forestry agriculture
B2		d GnGrPh	💧 ✳	D 0.05		L C F	Ft-ikmo FQ-ask	forests		forestry
B3		d GnGrPh CoSa	💧 ✳	D 0.29		L C F	QF-sbd FQ-ak CQ-cjz	forests ruderal		forestry recreation
C1		d GnGrCoSa MlLo	💧 ✳	D 6.63		L C F	QF-skjb	forests		forestry recreation
C2		vf LSG	£ ↓	D 7.96		F V G	FQ-s CQ-x QF-j	agri-segetal ruderal		settlement transport
D1		s GnArCoLo	⇗ ø	SR 2-3		M V L	QF-sb Ft-b	forests ruderal		forestry settlement
D2		dr GnArCo GnMeLo	💧 ✳	D 0.05		M L E	FQ-skb QF-sa Ft-d	forests ruderal		rural
D3		dr GnLiLo MaArCo	⇗ ø	D 0.05		M L F	QF-sh FQ-kcb CQ-ca	forests ruderal		rural
E1		dr GnApArCo	💧 ✳	D 0.05		M L F	QF-ksb Ft-bsd FQ-zcsk	forests ruderal		rural
E2		dr GnLi	💧 ✳	D 0.05		M L F	QF-skabjd Ft-wbd	forests ruderal		rural quarry
F1		p GrGnPh	⇆ ⇈	SR 2-3		M P L	QF-skb	forests agri		rural
F2		p PhGnDLS	⇆ ⇈	SR 2-3		V P M	FQ-m QF-s Ft-s	agri ruderal		rural centre
F3		p GnPhQu	⇆ ⇈	SR 2-3		V P M	Ft-hmksio QF-ks	agri ruderal		rural
F4		t GnMaDLS CoSa	⇆ ⇈	SR 2-3		V P M	QF-ksdzb Ft-d	agri ruderal		rural

Edaphic rows

a	stony
b	nutrient
c	drying
d	colluvial
e	eubasic
h	loamy
i	compaq
j	scree
k	acid
l	alluvial
m	oligobasic
o	pseudogleyed
s	fresh
t	tepid
w	fresh calcaric
x	erotherm
z	stunt

Rocks, earths

Ap	aplite
Ar	arkose
Co	conglomerate
D	deluvium
G	gravels
Gn	gneiss
Gr	granite
L	loams
Li	limestone
Lo	loess
Mb	marble
Me	metabasalt
Ml	marl
Ph	phyllite
Qu	quartzite
S	sands
Sa	sandstones

Potential forest vegetation tiers

CQ	Carpini querceta
FQ	Fagi querceta
QF	Querci fageta
Ft	Fageta typica
Ufc	Ulmi fraxineta carpini

Soils in soil cover

C	colluvisols
E	rendzinas
F	fluvisols
G	gleys
L	leptosols
M	cambisols
P	pseudogleys
V	luvisols

Columns in table

LF	landforms
TC	topoclimate
HC	hydrocycle
LU	land use
SC	soil dominated
PV	potential/reconstructed vegetation
AV	actual vegetation
RE	rocks, earths

Landforms

f	floodplains, valley floor
v	open wide valleys
s	steep step-like valley slopes
t	step-like rolling plateau
d	deep narrow valleys with steep slopes
r	ravines
p	rolling plateau

Topoclimate (*Quitt E., 1987*)

⇆ ⇈	high thermal amplitude, airing, vapouring
⇗ ø	moderate sunny slopes, catabatic
💧 ✳	moist, longer snow cover
£ ↓	inversions in depressions

Hydrocycle

D	discharge	in: $m^3.s^{-1}$
SR	specific run-off	in: $l.s^{-1}.km^{-2}$ (litres per a second and 1 sq. Km)

Source: Hynek et al., 2010.

CONCLUSION

The material practicalities of the project have been great surprise for the whole community. We debated on significant landscape elements stated in the official list of landscape/nature conservation for improving biodiversity in Deblín-locality. Run-off study offered the understanding accelerated anthropogeneous soil erosion, low underground water store and the link to sky precipitation collection. Weather forecasts from mass-media were corrected in (ir)radiation air regimes (katabatic/anabatic air circulation). Kaolinite deposits, karst phenomena, rock walls were explained hardly imagined geological/geomorphological history of rocks and landforms starting 500 million years ago in southern polar seas. And GIS technology fascinated everybody. What can we wish more?

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Shrnutí

V rámci mezinárodního projektu LENSUS bylo zvoleno Deblínsko za pilotní území pro výchovu k trvalé udržitelnosti. Projekt zahrnoval i studium přírodní krajiny založené na analýze mapových podkladů a terénním průzkumu. Podařilo se zkonstruovat i mapu fyzickogeografických celků intenzivními výzkumnými metodami a zaměřit se na studium materiality přírodních krajinných prostorových jednotek. Rovněž intenzivní sociální výzkum přinesl pozoruhodné výsledky spoluprací univerzity a základní školy, kdy rodiny žáků projevily nebývalý zájem o téma trvalé udržitelnosti a komunita žije tímto projektem. Rodiče byli překvapeni a přivítali výsledky studia pro svůj život.