

UDK 368.171:504
10.5937/TokOsig26023675

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UTICAJ PRIRODNIH KATASTROFA NA TRŽIŠTE OSIGURANJA

INFORMATIVNI PRILOG

Apstrakt

Prirodne katastrofe imaju izuzetan uticaj na ljudsku zajednicu, imovinu, infrastrukturu i životnu sredinu. Razumevanje potrebe za osiguranjem od posledica prirodnih katastrofa ključno je za adekvatno reagovanje na gubitke koje one izazivaju.

Jedan od ključnih aspekata u ovoj analizi jeste uticaj prirodnih katastrofa na tržište osiguranja i strategije upravljanja ovim rizicima. Osiguravajuće kuće suočavaju se sa izazovima u proceni dovoljnosti premija, dok se istovremeno nose s potrebom za inovacijama u pružanju osiguravajućih pokrića. Ovaj rad istražuje kako prirodne katastrofe utiču na tržište osiguranja, kako se razvijaju strategije upravljanja rizicima i kakve inovacije se primenjuju u sektoru osiguranja, s posebnim osvrtom na parametarsko osiguranje i njegove prednosti i izazove.

Ključne reči: prirodne katastrofe, parametarsko osiguranje, upravljanje rizicima od prirodnih katastrofa.

I Uvod

Katastrofalni događaji, koji su se tradicionalno smatrali relativno retkim pojavama, globalno postaju sve učestaliji, a njihove posledice sve izraženije. Takvi rizici predstavljaju značajan izazov za tržište osiguranja jer njihov nastanak može ugroziti

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Rad primljen: 11.1.2026.

Rad prihvaćen: 1.4.2026.

finansijsku stabilnost osiguravača. Istovremeno, oni predstavljaju i potencijalnu razvojnu priliku za sektor osiguranja, pogotovo u zemljama u razvoju.²

European Environment Agency definiše prirodne katastrofe kao nasilne, iznenadne i destruktivne promene koje se dešavaju u životnoj sredini bez uticaja ljudi usled fenomena kao što su poplave, zemljotresi, požari i uragani.³

Elementi od kojih se sastoje najčešće definicije prirodnih katastrofa su:

1. prirodni uzrok – prirodne katastrofe se događaju zbog prirodnih procesa ili fenomena, a ne direktno zbog ljudskih aktivnosti;
2. štetne posledice – prirodne katastrofe prouzrokuju štete i/ili vrše negativan uticaj na ljude, imovinu i/ili životnu sredinu;
3. iznenadno ili neočekivano – prirodne katastrofe često dolaze iznenada ili se brzo razvijaju, što ograničava vreme za uticaj na taj događaj;
4. raznolikost – prirodne katastrofe mogu biti raznovrsne i uključuju širok spektar događaja, od zemljotresa do uragana, suša, poplava, erupcija vulkana itd.

Osiguranje predstavlja jedan od ključnih elemenata u ublažavanju finansijskih posledica nastalih dejstvom prirodnih fenomena. Tržište osiguranja ima potencijal da funkcioniše kao mehanizam finansijske stabilizacije i zaštite, ali istovremeno se suočava s brojnim izazovima, od procene rizika i određivanja adekvatne premije, do isplate naknade i podizanja svesti o značaju osiguranja. Premija osiguranja predstavlja cenu osiguravajuće zaštite i zavisi od procene rizika, učestalosti i intenziteta štetnih događaja. Kod katastrofalnih rizika, premija je naročito značajna jer obuhvata troškove reosiguranja i rezervisanja sredstava za potencijalne štete.⁴ Istraživanja u ovoj oblasti postoje, ali se većinom fokusiraju na razvijene ekonomije, dok je u zemljama u razvoju, kao što je Srbija, stvarni uticaj prirodnih katastrofa na tržište osiguranja nedovoljno istražen. Postoji i nedostatak podataka o primeni inovativnih modela osiguranja, kao što je parametarsko osiguranje, koje može značajno ubrzati proces isplate štete i smanjiti troškove sprovođenja osiguranja.

II Uticaj prirodnih katastrofa na tržište osiguranja i strategije upravljanja rizicima

Još od nastanka čovečanstva, ljudi su se suočavali s mnogim opasnostima koje ugrožavaju život i imovinu. Brz razvoj industrije i tehnologije, globalno zagrevanje

² Jelena Kočović, Marija Koprivica, „Modeli osiguranja od katastrofalnih rizika i njihova primena u poljoprivredi“, *Novi proizvodi osiguranja, tehnološke inovacije i zaštita korisnika u osiguranju* (ur. Nataša Petrović Tomić), Pravni fakultet Univerziteta u Beogradu, Beograd, 2025, 370.

³ European Environment Agency, *Natural catastrophe*, dostupno na adresi: <https://www.eea.europa.eu/help/glossary/semide-emwis-thesaurus/natural-catastrophe>, 1. 7. 2024.

⁴ Nataša Petrović Tomić, *Osnovi prava osiguranja*, Pravni fakultet Univerziteta u Beogradu, Beograd, 2024, 71.

i povećana upotreba fosilnih goriva, između ostalog, doveli su do pojave osiguranja kao načina za preduzimanje mera u suočavanju s katastrofama koje se dešavaju i čiji broj i intenzitet svakim danom rastu. Tako je delatnost osiguranja nastala i razvijala se s ciljem pokrića šteta koje su obuhvaćene ugovorom o osiguranju, na principu prenosa rizika u zamenu za određeni iznos novca. Povećan nivo gasova sa efektom staklene bašte u atmosferi izaziva globalno zagrevanje i klimatske promene.⁵

Prirodne katastrofe umnogome, pored toga što vrše uticaj na ljude, vrše uticaj i na tržište osiguranja. Neki od uticaja su: 1. povećavanje ukupnog rizika i troškova osiguranja, pogotovo u područjima visokog rizika, 2. prirodne katastrofe koje mogu izazvati značajne gubitke osiguravajućih kuća, 3. prirodne katastrofe koje podstiču inovacije u osiguranju, kao što su usluge zaštite od prirodnih katastrofa.

Savremeni modeli upravljanja katastrofalnim rizicima zasnivaju se na javno-privatnim partnerstvima, u kojima država obezbeđuje subvencije premija osiguranja i reosiguranja, dok privatni sektor preuzima ulogu u prodaji polisa osiguranja i proceni šteta. Taj model omogućava bržu isplatu šteta i smanjuje fiskalni teret države.⁶

Percepcije o riziku menjaju se posle velikih katastrofalnih događaja, najbolji primeri jesu zakoni doneti u SAD (*U. S. National Flood Insurance Program (NFIP) i California Fair Access to Insurance Requirements (FAIR) Plan*).

U. S. National Flood Insurance Program (NFIP) jeste program osiguranja koji se odnosi na zaštitu vlasnika nekretnina od rizika poplave. Osnovni cilj *NFIP-a* jeste da pruži zaštitu od poplava, poboljša upravljanje rizika od poplava i razvije mape zona opasnosti od poplava. *NFIP* nudi polise osiguranja od poplava vlasnicima građevinskih objekata u zajednicama koje učestvuju u programu. Predmeti osiguranja po ovim polisama su građevinski objekti i sadržaj unutar građevinskih objekata. Iznos premije zavisi od lokacije građevinskog objekta, vrste gradnje, namene građevinskog objekta i obima pokrića.

U područjima koja su označena kao visokorizična, vlada zahteva obavezno osiguranje od poplava za vlasnike nekretnina koji su hipotekarno zaduženi kod federalnih zajmodavaca ili drugih kreditora. To se odnosi na područja koja se nalaze u poplavnom riziku prema mapama poplava *FEMA-e*.⁷

Od 1968. godine, Nacionalni program za osiguranje od poplava (*NFIP*) pruža federalno garantovano osiguranje od poplava vlasnicima kuća i poslovnih subjekata, sa preko pet miliona aktivnih polisa i pokrićem imovine u vrednosti od 1,2 biliona dolara do 2015. godine. To čini *NFIP* najvećim tržištem osiguranja od poplava

⁵ Serap Yörübulut, *Research of the Effect of Climate Change on Natural Disasters Occurring Between 1970–2023 in Terms of the Insurance Sector*, International Journal of Engineering Research & Development (IJERAD), No. 1/2025, 107.

⁶ Jelena Kočović, Marija Koprivica, Nataša Tešić, „Savremeni modeli upravljanja rizicima prirodnih katastrofa“, *Novi Ekonomist*, br. 23/2018, 8–9.

⁷ U.S. National Flood Insurance Program (NFIP), 2024, dostupno na: <https://www.floodsmart.gov/>, 28. 6. 2024.

u svetu. Međutim, program je kritikovan zbog toga što stimuliše osiguranike da ostanu u područjima gde su poplave česte, pravi neprecizne procene rizika, postavlja premije koje ne prate rizik, i nema dovoljno podsticaja za sprovođenje smanjenja rizika od katastrofa.⁸

Globalno, poplave su najskuplji prirodni rizik iz aspekta direktnih troškova poput onih koji proističu iz štete na građevinskim objektima i sadržajima unutar njih.⁹

California Fair Access to Insurance Requirements (FAIR) takođe su poznati kao planovi za pravičan pristup zahtevima za osiguranje. Tim zakonom osiguravajuće kuće koje posluju na teritoriji Kalifornije obavezuju se da će, ukoliko fizičko ili pravno lice nije u mogućnosti da pribavi osiguravajuće pokriće na regularnom tržištu osiguranja, pružiti pokriće. Taj način osiguranja se ne smatra primarnim načinom već se ovi planovi koriste kao poslednje sredstvo i pružaju osnovna pokrića za predmete osiguranja koji se smatraju visokorizičnim ili ih je komplikovano osigurati zbog drugih faktora kao što su lokacija, starost predmeta osiguranja ili vrsta gradnje.

To nije fond koji je osnovala država, što znači da ga poreski obveznici ne finansiraju već fond čine svi licencirani osiguravači u Kaliforniji i oni moraju biti deo *FAIR* plana. Preduslov za poslovanje osiguravajućeg društva u Kaliforniji jeste članstvo u fondu.¹⁰

Kako bi se nosile s gubicima, osiguravajuće kuće u svoje aktuarske modele uključile su i klimatske rizike. Nije iznenađujuće da su preciznije aktuarske projekcije dovele do rasta premija osiguranja, kao i do povlačenja mnogih kompanija sa tržišta podložnih riziku. Mnoge osiguravajuće kuće sada podižu cene na istorijski nivo, pri čemu povećanja premija znatno nadmašuju inflaciju. Takođe, neke kompanije su odlučile da potpuno napuste područja izložena klimatskim rizicima. Na primer, „*Allstate*“ i „*State Farm*“ su prestali da izdaju nove polise u Kaliforniji, a u Luizijani su osiguravajuće kuće obustavile izdavanje polisa u oblastima podložnim uraganima.¹¹

Reosiguravači imaju ključnu ulogu u upravljanju katastrofalnim rizicima, a sve češće se koriste i instrumenti tržišta kapitala, poput katastrofalnih obveznica, radi dodatne diverzifikacije rizika.¹² Vodeće reosiguravajuće kuće razvile su različite vrste alata za upravljanje rizicima od prirodnih katastrofa.

Jedan vrsta alata jeste *NATHAN (Natural Hazards Edition)*, koji je razvio „*Munich Re*“. *NATHAN* nudi izbor rešenja za procenu rizika i usklađenosti za tehničko

⁸ Lars Tjitzte de Ruig, et.al., „An agent-based model for evaluating reforms of the National Flood Insurance Program: A benchmarked model applied to Jamaica Bay, NYC“, *Risk analysis*, No. 2/2022, 406.

⁹ Samuel Rufat, Peter J. Robinson, Wouter J. W. Botzen., „Insights into the complementarity of natural disaster insurance purchases and risk reduction behavior“, *Risk Analysis*, No. 1/2023, 141.

¹⁰ U.S. National Flood Insurance Program (NFIP), 2024, <https://www.floodsmart.gov/>, 12. 7. 2024.

¹¹ Mark Nevitt i Michael Pappas, *Climate risk, insurance retreat, and state response*, *Georgia Law Review*, No. 4/2024, 1616-1617.

¹² J. Kočović, M. Korpivica, N. Tešić, 10.

osiguranje, zaštitu podataka, investicione odluke i analizu klimatskih promena. Taj alat omogućava izbor između tri različita segmenta upravljanja rizicima od prirodnih katastrofa: 1. *Natural Hazards Edition* za generisanje procena na osnovu podataka o prošlim događajima, 2. *Climate Change Edition* za procene vezane za budućnost na osnovu modela klimatskih promena, ili 3. *Wildfire HD Edition* sa većom rezolucijom kako bi se bolje razrešila zona šumske urbane interakcije (WUI) – ključna zona za lokacije visokog rizika i visoke vrednosti.¹³

„Swiss Re“ razvio je alat pod nazivom *NatCat*. *NatCat* je zasnovan na ocenjivanju rizika kombinovanjem opasnosti, gubitka, izloženosti sa odabranim pozadinskim mapama i satelitskim snimcima. Neki od podataka sadržani u tom alatu jesu i informacije o klimatskim promenama, uticaju katastrofalnih događaja i gustini naseljenosti.¹⁴

III Reagovanje osiguravajućih društava na katastrofalne rizike

Osiguravajuće kuće suočene su sa izazovom procene rizika i određivanja dovoljnosti premija u okruženju gde su prirodne katastrofe neizbežan rizik. Mnoge osiguravajuće kuće razvijaju inovativne usluge osiguranja, kao što su parametarska osiguranja, koja omogućavaju brže isplate odštete nakon katastrofa.

Parametarsko (indeksno) osiguranje predstavlja savremeni oblik osiguranja kod kog isplata naknade nije direktno vezana za stvarni nastanak materijalne štete. Umesto toga, isplata se aktivira kada određeni unapred definisani pokazatelj dostigne ili pređe zadati prag. Taj tip osiguranja najčešće se primenjuje u poljoprivredi, pogotovo za zaštitu useva, i namenjen je pre svega stanovništvu s nižim prihodima.¹⁵

Suštinski, parametarska osiguranja (osiguranja na bazi indeksa) zasnivaju se na verovatnoći da se desi unapred definisan događaj umesto nadoknađivanja stvarnog gubitka.¹⁶ Kako bi se bolje razumeo koncept parametarskog osiguranja, u nastavku su date ključne razlike između parametarskog i tradicionalnog osiguranja:¹⁷

1. za razliku od tradicionalnog osiguranja koje nadoknađuje stvarne gubitke, parametarsko pokriva štetu prema unapred definisanim parametrima;

¹³ Jonathan Meager, *Managing evolving risk with future-forward technology*, „Munich Re“, dostupno na adresi: <https://www.munichre.com/en/solutions/for-industry-clients/risk-suite-old.html>, 15. 7. 2024.

¹⁴ „Swiss Re“, CatNet, dostupno na adresi: <https://www.swissre.com/reinsurance/property-and-casualty/solutions/property-solutions/catnet.html>, 15. 7. 2024.

¹⁵ Marija Koprivica, Jelena Kočović, Drago Cvijanović, „A model for determining premium rates in index-based crop insurance“, *Economics of Agriculture*, No. 2/2024, 398.

¹⁶ Ole Ohlmeyer, et. al., What is parametric insurance?, „Swiss Re“, dostupno na adresi: https://corporate-solutions.swissre.com/insights/knowledge/what_is_parametric_insurance.html, 15. 7. 2024.

¹⁷ Andrea Đurović, „Implementacija nove tehnologije u osiguranju na primeru parametarskog osiguranja“, *Zbornik radova sa onlajn konferencije Udruženja pravnika u privredi Srbije i časopisa Pravo i privreda*, 2021, 113–114.

2. parametarsko osiguranje utvrđuje rizik koristeći unapred definisane parametre isplate i definisano ograničenje;
3. ugovor o osiguranju, pogotovo u Severnoj Americi, najčešće se zaključuje kao jednogodišnji ugovor, dok se ugovor o parametarskom osiguranju može zaključiti kao jednogodišnji ili višegodišnji ugovor;
4. tradicionalni ugovori o osiguranju koncipirani su prema već standardizovanim formama, dok se kod ugovora o parametarskom osiguranju vrši prilagođavanje s jedinstvenim indeksom i odredbama o isplati, zasnovano na specifičnim potrebama svakog osiguranika;
5. tradicionalni ugovor o osiguranju podrazumeva naknadu štete izazvane stvarnim gubitkom ili štetom od nastupanja osiguranog događaja, dok naknadu kod parametarskog osiguranja pokreće događaj koji prelazi parametarski prag (npr. zemljotres minimalne jačine 6,5 rihtera u određenom geografskom području);
6. procena stvarnih gubitaka kod tradicionalnog ugovora o osiguranju može biti složena i dugotrajna (često traje mesecima, čak i godinama), dok je isplata kod parametarskog osiguranja mnogo brža.

Neke prednosti parametarskog osiguranja su sledeće:¹⁸

1. Fleksibilnost i jednostavnost u oblikovanju usluga i prilagođavanju riziku. Ta vrsta osiguranja može biti uobličena za grupu pojedinačnih osiguranika, ali i prilagođena za svakog velikog klijenta ili grupu rizika jer se model zasniva na analizi učestalosti statistički dovoljnog broja događaja pokrivenih šteta.
2. Smanjenje informacijskih prepreka. Pošto se isplata u parametarskom osiguranju vrši na osnovu objektivnog nastanka unapred definisanog gubitka, osiguravač ne mora da prati ponašanje osiguranika tokom perioda pokrića. Isplata je unapred određena i osiguranik nema ekonomski motiv da menja ishod štete.
3. Isplate u parametarskom osiguranju mogu biti izvršene brzo nakon što je potvrđen osigurani slučaj. Taj način isplate štete može učiniti parametarsko osiguranje privlačnim širokom spektru osiguranika, uključujući i korporativne klijente.
4. Troškovi sprovođenja osiguranja su niži kod parametarskog osiguranja, budući da parametarsko osiguranje ne zahteva procenu rizika svakog osiguranika niti istraživanje šteta.

Upravljanje katastrofalnim rizicima može se zasnivati na *ex post* pristupu, koji podrazumeva saniranje posledica putem državne pomoći i zaduživanja, ili na *ex ante* pristupu, koji uključuje osiguranje i preventivne mere. *Ex ante* pristup

¹⁸ Xiao Lin, Jean Kwon, „Application of Parametric Insurance in Principle/Regulation-Compliant and Innovative Ways“, *Risk Management & Insurance Review*, No. 2/2020, 9–11.

omogućava bržu i pravedniju raspodelu tereta i smanjuje potrebu za angažovanjem javnih sredstava.¹⁹

Primeri parametarskog osiguranja u zemljama u razvoju uključuju *CCRIF* (Karibi), *ARC* (Afrika) i *PCRAFI* (Pacifik). *CCRIF* od 2007. godine pruža zaštitu od uragana i zemljotresa, a kasnije i od padavina, dok slični modeli na Pacifiku i u Africi funkcionišu uz podršku međunarodnih donatora. Ti fondovi obezbeđuju brzu i povoljnu finansijsku pomoć, smanjujući zavisnost od humanitarne pomoći i jačajući otpornost na katastrofe. Parametarsko osiguranje najčešće se koristi za pokrivanje rizika poput uragana, poplava, zemljotresa ili suše, naročito tamo gde je procena stvarnih gubitaka složena ili skupa, ili u područjima sa ograničenim podacima i infrastrukturuom.

Jedna od finansijskih organizacija koja afirmiše parametarsko osiguranje jeste *World Bank* u okviru programa *Disaster Risk Financing and Insurance Program (DRFIP)*. Kroz inovativni mehanizam osiguranja, brze isplate pomažu zemljama članicama da finansiraju svoje početne odgovore na katastrofe, ublažavajući kratkoročne probleme s gotovinskim tokom koje trpe ekonomije u razvoju nakon velikih katastrofa, te pomažući zemljama članicama da održe osnovne funkcije vlade nakon katastrofalnog događaja. Isplativost usluga povećava se kroz grupisanje rizika između zemalja članica kako bi se optimizovao njihov pristup deljenim rezervama i diverzifikovana pokrivenost na međunarodnom tržištu reosiguranja.²⁰

Kao što je prethodno napomenuto, „*Munich Re*“ i „*Swiss Re*“, pored vrsta alata koje se tiču upravljanje rizicima od katastrofa, uključuju i parametarsko osiguranje.

Da bi parametarsko osiguranje imalo primenu, osiguravači moraju posedovati specijalizovane vrste alata za kontinuiranu analizu i modelovanje katastrofalnih rizika, sve u cilju određivanja parametara, sume osiguranja i premije, u zavisnosti od rizika, ranjivosti, verovatnoće pojave, osiguranih područja, aktivnosti itd. Uvođenje parametarskog osiguranja može se sagledati kroz dva faktora. Prvi faktor se odnosi na potencijalnog kupca parametarskog osiguranja koji npr. u poljoprivredi može brže sagledati posledice odluke da kupi ili ne kupi proizvod. Dužina perioda pokrića veoma je važna i za kupca i za ponuđača proizvoda. Obe strane su zainteresovane da formiraju rezerve koje omogućavaju pokriće značajnih šteta.²¹

Još jedan uobičajeni oblik reosiguravajućeg pokrića za štete nastale kao posledica prirodnih katastrofa jesu pokrića koja se obezbeđuju kroz *Nat Cat XL (Natural catastrophe excess-of-loss)* ugovore i *Aggregate Stop Loss* ugovore.²²

¹⁹ Jelena Kočović, Tatjana Rakonjac-Antić, Marija Koprivica, „Rizik pandemije – pretnja ili šansa za delatnost osiguranja?“, *Tokovi osiguranja*, br. 2/2020, 14.

²⁰ Claudia Herrera, *Risk insurance builds climate and disaster resilience in Central America and the Caribbean*, World Bank group, 2022, dostupno na adresi: <https://www.worldbank.org/en/results/2022/04/21/risk-insurance-builds-climate-and-disaster-resilience-in-central-america-and-the-caribbean>, 17. 7. 2024.

²¹ Nicoleta Radu i Felicia Alexandru, *Parametric Insurance-A Possible and Necessary Solution to Insure the Earthquake Risk of Romania*, *Risks*, 2022, 13–14.

²² Jelena V. Doganjić, Marija V. Paunović, „Upravljanje rizicima od prirodnih katastrofa“, *Tokovi osiguranja*, br. 3/2021, 49.

IV Prirodne katastrofe u Srbiji i njihov uticaj na tržište osiguranja

Najčešći oblici prirodnih katastrofa u Srbiji jesu poplave, zemljotresi i požari, te stoga osiguranje imovine obuhvata zaštitu od rizika koji ugrožavaju materijalna dobra, kao što su poplave, požari i zemljotresi, dok osiguranje lica štiti osiguranika od rizika vezanih za život i zdravlje. U kontekstu prirodnih katastrofa, osiguranje imovine ima ključnu ulogu u smanjenju negativnih ekonomskih posledica.²³

Poplave, kao jedan od najčešćih oblika ekstremnih vremenskih nepogoda, redovno pogađaju teritoriju Republike Srbije. Nakon katastrofalnih poplava u maju 2014. godine, u stručnoj i opštoj javnosti sve češće se koristi termin „bujične poplave“ za označavanje pojava koje nastaju na manjim vodotokovima bujičnog karaktera.

U poslednjim godinama, poplave su najčešće proglašavane u opštinama smeštenim u brdskim i planinskim područjima. Zbog toga su najčešće imale karakter bujičnih poplava, koje se odlikuju naglim nastankom, kratkim trajanjem i velikim količinama nanosa vode. Očekuje se da će se ti problemi dodatno intenzivirati usled promena u obrascima padavina izazvanih klimatskim promenama, starenja komunalne infrastrukture, kao i stalnog urbanog širenja, pri čemu nepropusne površine sve više zamenjuju prirodne propusne terene i sisteme drenaže.²⁴

Na sajtu *UNDRR-ovog DesInventar-a* može se pronaći baza podataka koja sadrži sve katastrofalne događaje u Srbiji i njihove posledice od 1980. godine do 2023. godine.

Grafikon 1

Uništeni i oštećeni objekti



Izvor: UNDRR, dostupno na adresi:
<https://www.desinventar.net/>,
pristupljeno 22. 7. 2024.

²³ Nataša Petrović Tomić, *Osnovi prava osiguranja*, Beograd, Pravni fakultet Univerziteta u Beogradu, 2024, 89.

²⁴ Aleksandar Drobniak, Ratko Ristić i Nada Dragović, *The Role and Significance of Operational Flood Defense Plans on the Waters Second-Order in Republic of Serbia*, Water, Aug 2024, 2.

Na Grafikonu 1 prikazano je delovanje prirodnih katastrofa na stambeni prostor u Srbiji u periodu od 1980. do 2023. godine. U najvećem procentu do oštećenja ili uništenja stambenog prostora u Srbiji došlo je usled poplava (59%), zatim dejstvom zemljotresa (14%), grada (11%), eksplozije (5%), snežne oluje (2%), oluje (1%), bujice (1%), požara (1%) i ostalog (2%).

1. Uticaj poplava kao najučestalijeg prirodnog rizika na tržište osiguranja u Srbiji

Kao što je prethodno analizirano, najčešća oštećenja na imovini javljaju se usled poplava. U Srbiji je u poslednjih 10 godina registrovano više štetnih događaja koje su izazvale poplave i koji su imale veliki uticaj na ekonomiju, ljude i životnu sredinu. Jedan od tih događaja desio se u maju 2014. godine i imao je uticaj na skoro čitavu teritoriju Srbije. Prema podacima sa *DesInventar-a*, štete koje su se dogodile na imovini u toj godini zauzimaju najveće razmere od 1980. godine.

Ukupna šteta nastala u 24 opštine koje su najviše pogođene tokom poplava iznosi milijardu i petsto dvadeset pet miliona evra, od čega 885 miliona evra (57% ukupnih šteta) predstavljaju štete na materijalnim dobrima, dok ostatak od 640 miliona evra (49% od ukupnog iznosa) čine štete u proizvodnji. Ako se u obzir uzmu i ostale pogođene opštine, ukupan iznos šteta i efekti poplava se penju na 1,7 milijardi evra. Pokazalo se da je ukupna šteta od poplava uglavnom koncentrisana u proizvodnim aktivnostima (milijardu i sedamdeset miliona evra i 70% ukupne štete), u uslugama socijalne zaštite (242 miliona evra i 16%) i u infrastrukturi (192 miliona evra i 12%); stoga, uticaj poplava je bio najveći u oblasti proizvodnje i pristupa socijalnim uslugama, u odnosu na razaranje koje je pretrpela infrastruktura različitih oblika. U pogledu pojedinačnih sektora ekonomske i socijalne aktivnosti, najpogođeniji sektori bili su rudarstvo i energetika (494 miliona evra i 32% ukupnih šteta i gubitaka), posle čega sledi stanovanje (231 milion evra i 15%), poljoprivreda (228 miliona evra i 15%), trgovina (225 miliona evra i 15%) te saobraćaj (167 miliona evra i 11%).²⁵

Od ukupnog broja šteta koje su se desile usled poplava podneto je 3299 zahteva za naknadu štete u iznosu od 38,8 miliona evra, koji se uglavnom odnose na osiguranje imovine od požara i nekih drugih opasnosti, ostala osiguranja imovine i na auto-kasko osiguranje. Porast prijavljenih šteta tokom poplava 2014. godine doveo je i do negativnog odnosa između premije i prijavljenih šteta, što je, nadalje, uticalo na ostvarene rezultate poslovanja jer je ukupna premija za osiguranje rizika od poplave iznosila 5,4 miliona evra.²⁶

²⁵ UN Serbia, World Bank Group, EU, „Poplave u Srbiji 2014“, 2014, dostupno na adresi: <https://www.obnova.gov.rs/uploads/useruploads/Documents/Izvestaj-o-proceni-potreba-za-oporavak-i-obnovu-posledica-poplava.pdf>, 10. 8. 2024, 4.

²⁶ Milan B. Cerović, „Rezultati osiguranja u Republici Srbiji u 2014. godini“, *Tokovi osiguranja*, br. 3/2015, 24.

Poređenja radi, u izveštaju NBS o rešenim štetama, u poslovima osiguranja na kraju IV kvartala 2014. godine ukupno je isplaćeno 27.707.550.000 RSD, dok je po vrstama osiguranja iste te godine a po osiguranju imovine od požara i drugih opasnosti (0801 – osiguranje od požara i drugih opasnosti izvan industrije i zanatstva i 0802 – osiguranje od požara i drugih opasnosti u industriji i zanatstvu) isplaćeno 1.891.296.000 RSD. Procentualno posmatrano, udeo isplaćenih šteta po linijama 0801 i 0802 u ukupnom iznosu doseže 6,82%, od čega je 38,8 miliona evra isplaćeno na ime šteta koje su se dogodile tokom poplava 2014. godine.

S obzirom na to da je nastala ogromna šteta koja je u minimalnom delu bila pokrivena iz osiguranja, država je preduzela određene aktivnosti kako bi smanjila štetne razmere. Republika Srbija je zatražila i prihvatila pomoć međunarodnih organizacija, poput Evropske unije i drugih država, u vidu finansijske pomoći, opreme i stručnog osoblja za hitne intervencije.

Republika Srbija je nakon poplava pružala finansijsku pomoć i subvencije za obnovu oštećenih domaćinstava, infrastrukture i privrednih objekata.

Jedan od predloga za unapređenje upravljanja rizicima od prirodnih katastrofa jeste razvoj specijalizovanih vrsta alata, po uzoru na vodeće reosiguravajuće kuće, kao što su *NATHAN* i *NatCat*. Te vrste alata omogućavaju simulaciju potencijalnih šteta izazvanih prirodnim katastrofama, što doprinosi kvalitetnijem preuzimanju rizika, unapređenju usluge koju osiguravači pružaju osiguranicima, kao i efikasnijem donošenju odluka unutar osiguravajućih društava.

Neizostavan je i razvoja parametarskog osiguranja koji bi uticao na smanjenje troškova osiguravača i vremena procene štete pri nastupanju štetnog događaja. Ukoliko bismo posmatrali fiktivni scenario u kom je osiguranik osigurao svoju imovinu od rizika poplave na osnovu prethodnog definisanog parametra – nivoa reke, prethodno definisani štetni događaj je nastupio i nivo reke je premašio 3 m, u tom slučaju biće isplaćena unapred ugovorena suma osiguranja. Dakle, parametarsko osiguranje nije u korelaciji sa stvarnim štetama već je zasnovano na unapred definisanim parametrima (indeksima) koji se odnose na konkretne događaje.

V Zaključak

Prirodne katastrofe predstavljaju kompleksan izazov kako za društvo tako i za tržište osiguranja. Posledice koje ostavljaju prirodne katastrofe zahtevaju efikasne strategije upravljanja rizicima i inovacije u sektoru osiguranja. Parametarsko osiguranje se ističe kao važan alat u pružanju brzih i efikasnijih odgovora na katastrofalne događaje, dok su inovativne tehnologije kao što su *NATHAN* i *NatCat* ključne za unapređenje procene rizika i upravljanja katastrofama.

S obzirom na sve veću učestalost i intenzitet prirodnih katastrofa, kontinuirana edukacija, unapređenje zakonskih okvira i međunarodna saradnja neophodni

su za smanjenje štetnih posledica i poboljšanje otpornosti zajednica. Razvijanje i primena inovativnih rešenja u sektoru osiguranja može značajno doprineti smanjenju negativnih efekata prirodnih katastrofa. Istraživanja i inovacije treba kontinuirano razvijati kako bi se osigurala održivost tržišta osiguranja u svetlu klimatskih promena i rastućih rizika od prirodnih katastrofa. Treba uzeti u razmatranje i promovisanje parametarskog osiguranja, sve radi brže isplate štete, kao i međunarodnu saradnju i primenu savremenih tehnologija za procenu rizika.

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UDK 368.171:504
10.5937/TokOsig2602367S

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THE EFFECTS OF NATURAL DISASTERS ON THE INSURANCE MARKET

INFORMATIVE CONTRIBUTION

Abstract

Natural disasters exert a significant impact on human communities, property, infrastructure, and the environment. Understanding the need for insurance coverage against the consequences of such events is essential for an effective response to the losses they generate.

One of the key aspects of this analysis is the impact of natural disasters on the insurance market and the strategies for managing these risks. Insurance companies face challenges in assessing the adequacy of premiums, while simultaneously dealing with the need for innovation in the provision of insurance coverage. This paper examines how natural disasters affect the insurance market, how risk management strategies are developed, and which innovations are applied in the insurance sector, with particular emphasis on parametric insurance and the advantages and challenges associated with it.

Keywords: natural disasters, parametric insurance, natural disaster risk management

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Paper received: 11.1.2026.

Paper accepted: 1.4.2026.

I Introduction

Catastrophic events, traditionally considered relatively rare occurrences, are becoming increasingly frequent on a global scale, with their consequences growing more severe. Such risks represent a significant challenge for the insurance market, as their occurrence may threaten the financial stability of insurers. At the same time, they also represent a potential development opportunity for the insurance sector, particularly in developing countries.²

The European Environment Agency defines natural disasters as violent, sudden, and destructive changes occurring in the environment without human influence, resulting from phenomena such as floods, earthquakes, wildfires, and hurricanes.³

The elements that most commonly comprise definitions of natural disasters are:

1. natural cause – natural disasters occur as a result of natural processes or phenomena, rather than being directly caused by human activities;
2. loss and damage – natural disasters result in damage and/or negatively affect people, property, and/or the environment;
3. sudden or unexpected occurrence – natural disasters often occur suddenly or develop rapidly, which limits the time available to respond to or influence the event;
4. diversity – natural disasters can be highly diverse and include a wide range of events such as earthquakes, hurricanes, droughts, floods, and volcanic eruptions.

Insurance represents one of the key elements in mitigating the financial consequences arising from the effects of natural phenomena. The insurance market has the potential to function as a mechanism of financial stabilization and protection, however, it also faces numerous challenges, ranging from risk assessment and the determination of adequate premiums to claims settlement and raising awareness of the importance of insurance. The insurance premium represents the price of insurance protection and depends on risk assessment, as well as the frequency and intensity of loss events. In the case of catastrophic risks, the premium is particularly significant, as it includes the costs of reinsurance and the allocation of funds for potential losses.⁴ Research in this field exists, but it is predominantly focused on developed economies, while in developing countries such as Serbia, the actual impact of natural disasters on the insurance market remains insufficiently explored. There is also a lack of data on

² Jelena Kočović, Marija Koprivica, „Modeli osiguranja od katastrofalnih rizika i njihova primena u poljoprivredi“, *Novi proizvodi osiguranja, tehnološke inovacije i zaštita korisnika u osiguranju* (ed. Nataša Petrović Tomić), Pravni fakultet Univerziteta u Beogradu, Beograd, 2025, 370.

³ European Environment Agency, *Natural catastrophe*, available at: <https://www.eea.europa.eu/help/glossary/semide-emwis-thesaurus/natural-catastrophe>, 1.6.2024.

⁴ Nataša Petrović Tomić, *Osnovi prava osiguranja*, Beograd, Pravni fakultet Univerziteta u Beogradu, 2024, 71.

the implementation of innovative insurance models, such as parametric insurance, which can significantly accelerate the claims settlement process and reduce the costs of insurance administration.

II The Impact of Natural Disasters on the Insurance Market and Risk Management Strategies

Throughout human history, people have faced numerous dangers threatening life and property. The rapid development of industry and technology, global warming, and the increased use of fossil fuels, among other factors, have led to the emergence of insurance as a means of mitigating the effects of disasters, the frequency and intensity of which continue to grow. In this context, the insurance industry was established and has evolved with the goal of covering damages outlined in the insurance contract, based on the principle of risk transfer in exchange for a specified monetary amount. The increased concentration of greenhouse gases in the atmosphere is driving global warming and climate change.⁵

Natural disasters significantly affect not only people but also the insurance market. Some of the impacts include: 1. the increase in overall risk and insurance costs, especially in high-risk areas, 2. natural disasters that may cause substantial losses for insurance companies, 3. natural disasters that stimulate innovation in insurance, such as disaster protection services.

Modern models of managing catastrophic risks are based on public-private partnerships, in which the government provides subsidies for insurance and reinsurance premiums, while the private sector assumes a role in selling insurance policies and assessing damages. This model enables faster claims settlements and reduces the fiscal burden on the government.⁶

Perceptions of risk change after major catastrophic events, with the best examples being the laws enacted in the United States (*U. S. National Flood Insurance Program (NFIP)* and *California Fair Access to Insurance Requirements (FAIR) Plan*).

U. S. National Flood Insurance Program (NFIP) is an insurance program that provides protection to property owners from the risk of flooding. The primary goal of the *NFIP* is to provide flood protection, improve flood risk management, and develop flood hazard zone maps. The *NFIP* offers flood insurance policies to owners of buildings in communities participating in the program. The items covered by these policies include buildings and the contents within the buildings. The premium

⁵ Serap Yörübulut, *Research of the Effect of Climate Change on Natural Disasters Occurring Between 1970–2023 in Terms of the Insurance Sector*, International Journal of Engineering Research & Development (IJERAD), No. 1/2025, 107.

⁶ Jelena Kočović, Marija Koprivica, Nataša Tešić, „Savremeni modeli upravljanja rizicima prirodnih katastrofa“, *Novi Ekonomist*, No. 23/2018, 8–9.

amount depends on the location of the building, the type of construction, the purpose of the building, and the extent of coverage.

In areas designated as high-risk, the government requires mandatory flood insurance for property owners who have a mortgage with federal lenders or other creditors. This applies to areas that are identified as flood-prone according to FEMA's flood maps.⁷

Since 1968, the *National Flood Insurance Program (NFIP)* has provided federally guaranteed flood insurance to homeowners and businesses, with over five million active policies and property coverage valued at \$1.2 trillion by 2015. This makes *NFIP* the largest flood insurance market in the world. However, the program has been criticized for encouraging policyholders to remain in areas prone to frequent flooding, making inaccurate risk assessments, setting premiums that do not reflect the actual risk, and lacking sufficient incentives for implementing disaster risk reduction measures.⁸

Globally, floods are the most costly natural risk in terms of direct costs, such as those arising from damage to buildings and their contents.⁹

California Fair Access to Insurance Requirements (FAIR) are also known as plans for fair access to insurance coverage. Under this law, insurance companies operating in California are required to provide coverage if an individual or legal entity is unable to obtain insurance coverage through the regular insurance market. This type of insurance is not considered the primary method; rather, these plans are used as a last resort and provide basic coverage for insurance subjects considered high-risk or difficult to insure due to factors such as location, age of the property, or type of construction.

This is not a fund established by the state, meaning it is not funded by taxpayers. Instead, the fund is comprised of all licensed insurers in California, and they are required to be part of the FAIR plan. A prerequisite for operating an insurance company in California is membership in the fund.¹⁰

In order to manage losses, insurance companies have incorporated climate risks into their actuarial models. It is not surprising that more accurate actuarial projections have led to increased insurance premiums, as well as the withdrawal of many companies from high-risk markets. Many insurers are now raising prices to historical levels, with premium increases significantly surpassing inflation. Additionally, some companies have decided to completely exit areas exposed to climate risks. For

⁷ U.S. National Flood Insurance Program (NFIP), 2024, available at: <https://www.floodsmart.gov/>, 28.6.2024.

⁸ Lars Tjitz de Ruig, et. al., „An agent-based model for evaluating reforms of the National Flood Insurance Program: A benchmarked model applied to Jamaica Bay, NYC“, *Risk analysis*, No. 2/2022, 406.

⁹ Samuel Rufat, Peter J. Robinson, Wouter J. W. Botzen., „Insights into the complementarity of natural disaster insurance purchases and risk reduction behavior“, *Risk Analysis*, No. 1/2023, 141.

¹⁰ U.S. National Flood Insurance Program (NFIP), 2024, <https://www.floodsmart.gov/>, 12.7.2024.

example, „Allstate“ and „State Farm“ have stopped issuing new policies in California, and in Louisiana, insurers have halted policy issuance in hurricane-prone areas.¹¹

Reinsurers play a key role in managing catastrophic risks, and increasingly, capital market instruments such as catastrophe bonds are being used for additional risk diversification.¹² Leading reinsurers have developed various tools for managing natural disaster risks.

One such tool is *NATHAN (Natural Hazards Edition)*, developed by Munich Re. *NATHAN* offers a selection of solutions for risk assessment and compliance in technical insurance, data protection, investment decisions, and climate change analysis. The tool provides users with the option to choose from three different segments of natural disaster risk management: 1. *The Natural Hazards Edition* for generating assessments based on data from past events, 2. *The Climate Change Edition* for projections related to the future based on climate change models, or 3. *The Wildfire HD Edition*, offering higher resolution to better resolve the Wildland-Urban Interface (WUI) - a key area for high-risk and high-value locations.¹³

„Swiss Re“ has developed a tool called *NatCat*. *NatCat* is based on risk assessment by combining hazard, loss, exposure with selected background maps and satellite imagery. Some of the data included in this tool are information on climate change, the impact of catastrophic events, and population density.¹⁴

III The Response of Insurers to Catastrophic Risks

Insurers are faced with the challenge of risk assessment and determining the adequacy of premiums in an environment where natural disasters are an inevitable risk. Many insurers are developing innovative insurance services, such as parametric insurance, which enable faster claims payouts after catastrophic events.

Parametric (index-based) insurance is a modern form of insurance where the compensation payout is not directly linked to the actual occurrence of material damage. Instead, the payout is triggered when a predefined indicator reaches or exceeds a specified threshold. This type of insurance is most commonly applied in agriculture, especially for crop protection, and is primarily intended for populations with lower incomes.¹⁵

¹¹ Mark Nevitt, Michael Pappas, "Climate risk, insurance retreat, and state response", *Georgia Law Review*, No. 4/2024, 1616-1617.

¹² Jelena Kočović, Marija Koprivica, Nataša Tešić, „Savremeni modeli upravljanja rizicima prirodnih katastrofa“, *Novi ekonomist*, No. 23/2018, 10.

¹³ Jonathan Meager, *Managing evolving risk with future-forward technology*, „Munich Re“, available at: <https://www.munichre.com/en/solutions/for-industry-clients/risk-suite-old.html>, 15.7.2024.

¹⁴ „Swiss Re“, CatNet, available at: <https://www.swissre.com/reinsurance/property-and-casualty/solutions/property-solutions/catnet.html>, 15.7.2024.

¹⁵ Marija Koprivica, Jelena Kočović, Drago Cvijanović, „A model for determining premium rates in index-based crop insurance“, *Economics of Agriculture*, No. 2/2024, 398.

Essentially, parametric insurance (index-based insurance) is based on the probability of a predefined event occurring, rather than compensating for the actual loss. To better understand the concept of parametric insurance, the key differences between parametric and traditional insurance are presented below:¹⁶

1. in contrast to traditional insurance, which compensates for actual losses, parametric insurance covers damage based on predefined parameters;
2. parametric insurance determines risk using predefined payout parameters and a specified limit;
3. an insurance policy, especially in North America, is typically concluded as a one-year policy, while a parametric insurance policy can be concluded as either a one-year or multi-year policy;
4. traditional insurance policies are structured according to pre-standardized forms, while parametric insurance policies are customized with a unique index and payout provisions, based on the specific needs of each policyholder;
5. a traditional insurance policy involves compensation for damage caused by an actual loss or harm resulting from the occurrence of the insured event, while compensation under parametric insurance is triggered by an event exceeding the parametric threshold (e.g., an earthquake of at least magnitude 6.5 on the Richter scale in a specific geographical area);
6. the assessment of actual losses in a traditional insurance policy can be complex and time-consuming (often taking months or even years), while payouts under parametric insurance are much faster.

The following are some of the advantages of parametric insurance:¹⁷

1. Flexibility and simplicity in shaping services and tailoring them to specific risks. This type of insurance can be designed for a group of individual policyholders, as well as customized for large clients or risk groups, as the model is based on the analysis of the frequency of a statistically sufficient number of events covered by the insurance.
2. Reduction of informational barriers. Since payouts in parametric insurance are based on the objective occurrence of a predefined loss, the insurer does not need to monitor the behavior of the policyholder during the coverage period. The payout is predetermined, and the policyholder has no economic incentive to alter the outcome of the claim.
3. Payouts in parametric insurance can be made quickly once the insured event is confirmed. This method of claims settlement can make

¹⁶ Andrea Đurović, „Implementacija nove tehnologije u osiguranju na primeru parametarskog osiguranja“, *Zbornik radova sa onlajn konferencije Udruženja pravnika u privredi Srbije i časopisa Pravo i privreda*, 2021, 113–114.

¹⁷ Xiao Lin, Jean Kwon, „Application of Parametric Insurance in Principle/Regulation-Compliant and Innovative Ways“, *Risk Management & Insurance Review*, No. 2/2020, 9–11.

parametric insurance attractive to a wide range of policyholders, including corporate clients.

4. The implementation costs of parametric insurance are lower, as parametric insurance does not require the assessment of each policyholder's risk or the investigation of damages.

Disaster risk management can be based on an *ex post* approach, which involves addressing the consequences through state aid and borrowing, or an *ex ante* approach, which includes insurance and preventive measures. The *ex ante* approach allows for a faster and fairer distribution of the burden and reduces the need for the engagement of public funds.¹⁸

Examples of parametric insurance in developing countries include CCRIF (Caribbean), ARC (Africa), and PCRAFI (Pacific). Since 2007, CCRIF has provided protection against hurricanes and earthquakes, and later, against rainfall, while similar models in the Pacific and Africa operate with the support of international donors. These funds provide rapid and cost-effective financial assistance, reducing dependence on humanitarian aid and enhancing disaster resilience. Parametric insurance is most commonly used to cover risks such as hurricanes, floods, earthquakes, or droughts, particularly in areas where assessing actual losses is complex or expensive, or in regions with limited data and infrastructure.

One of the financial organizations promoting parametric insurance is the World Bank through its *Disaster Risk Financing and Insurance Program (DRFIP)*. Through this innovative insurance mechanism, rapid payouts assist member countries in financing their initial responses to disasters, alleviating short-term cash flow problems that developing economies face after major catastrophes, and helping member countries maintain basic government functions following a catastrophic event. The cost-effectiveness of the services is increased through risk pooling among member countries to optimize their access to shared reserves and diversify coverage on the international reinsurance market.¹⁹

As previously mentioned, both „Munich Re“ and „Swiss Re“, in addition to the types of tools related to disaster risk management, also include parametric insurance.

For parametric insurance to be applied, insurers must possess specialized tools for continuous analysis and modeling of catastrophic risks, with the goal of determining parameters, coverage amounts, and premiums, depending on risk, vulnerability, probability of occurrence, insured areas, activities, etc. The introduction of parametric insurance can be viewed through two factors. The first factor concerns

¹⁸ Jelena Kočović, Tatjana Rakonjac-Antić, Marija Koprivica, „Rizik pandemije – pretnja ili šansa za delatnost osiguranja?“, *Tokovi osiguranja*, No. 2/2020, 14.

¹⁹ Claudia Herrera, *Risk insurance builds climate and disaster seilence in Central America and the Caribbean*, World Bank group, 2022, available at: <https://www.worldbank.org/en/results/2022/04/21/risk-insurance-builds-climate-and-disaster-resilience-in-central-america-and-the-caribbean>, 17.7.2024.

the potential buyer of parametric insurance, who, for example, in agriculture, can more quickly assess the consequences of the decision to purchase or not purchase the product. The duration of the coverage period is very important for both the buyer and the product provider. Both parties are interested in forming reserves that enable coverage of significant losses.²⁰

Another common form of reinsurance coverage for damages resulting from natural disasters is coverage provided through *Nat Cat XL (Natural Catastrophe Excess-of-Loss)* contracts and *Aggregate Stop Loss treaty*.²¹

IV Natural Disasters in Serbia and Their Impact on the Insurance Market

The most common types of natural disasters in Serbia are floods, earthquakes, and fires. Therefore, property insurance covers protection against risks that threaten material assets, such as floods, fires, and earthquakes, while personal insurance protects the policyholder against risks related to life and health. In the context of natural disasters, property insurance plays a crucial role in mitigating negative economic consequences.²²

Floods, as one of the most common forms of extreme weather events, regularly affect the territory of the Republic of Serbia. Following the catastrophic floods in May 2014, the term „flash floods“ has become increasingly used in both professional and general public discourse to describe phenomena occurring in smaller streams with flash flood characteristics.

In recent years, floods have most commonly been declared in municipalities located in hilly and mountainous areas. As a result, they have most often been flash floods, characterized by their sudden onset, short duration, and large amounts of water runoff. It is expected that these problems will be further intensified due to changes in precipitation patterns caused by climate change, the aging of municipal infrastructure, and continuous urban expansion, with impermeable surfaces increasingly replacing natural permeable land and drainage systems.²³

On the UNDRR DesInventar website, a database is available that contains all catastrophic events in Serbia and their consequences from 1980 to 2023.

²⁰ Nicoleta Radu, Felicia Alexandru, *Parametric Insurance-A Possible and Necessary Solution to Insure the Earthquake Risk of Romania*, Risks, 2022, 13–14.

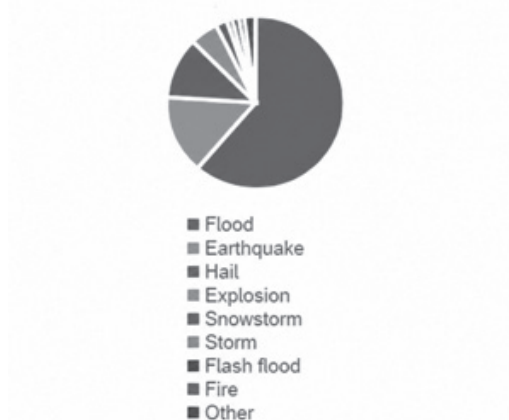
²¹ Jelena V. Doganjić, Marija V. Paunović, „Upravljanje rizicima od prirodnih katastrofa“, *Tokovi osiguranja*, No. 3/2021, 49.

²² Nataša Petrović Tomić, *Osnovi prava osiguranja*, Beograd, Pravni fakultet Univerziteta u Beogradu, 2024, 89.

²³ Aleksandar Drobniak, Ratko Ristić, Nada Dragović, *The Role and Significance of Operational Flood Defense Plans on the Waters Second-Order in Republic of Serbia*, Water, Aug 2024, 2.

Chart 1

Destroyed and Damaged Properties



Source: UNDRR, available at: <https://www.desinventar.net/>, accessed: 22 July 2024.

Chart 1 shows the impact of natural disasters on residential properties in Serbia from 1980 to 2023. The highest percentage of damage or destruction to residential properties in Serbia occurred due to floods (59%), followed by earthquakes (14%), hail (11%), explosions (5%), snowstorms (2%), storms (1%), flash floods (1%), fires (1%), and other causes (2%).

1. The Impact of Floods as the Most Frequent Natural Risk on the Insurance Market in Serbia

As previously analyzed, the most frequent property damage occurs due to floods. In the last 10 years, Serbia has recorded numerous damaging events caused by floods, which had a significant impact on the economy, people, and the environment. One of these events occurred in May 2014 and affected nearly the entire territory of Serbia. According to data from *DesInventar*, the damages to property in that year represent the largest scale of losses since 1980.

The total damage in the 24 municipalities most affected by the floods amounts to one billion five hundred twenty-five million euros, of which 885 million euros (57% of the total damage) represent damage to material goods, while the remaining 640 million euros (49% of the total amount) consist of losses in production. When taking into account the other affected municipalities, the total damage and flood effects rise to 1.7 billion euros. It has been shown that the total damage from the floods was mostly concentrated in production activities (one billion seventy million

euros, or 70% of the total damage), in social protection services (242 million euros, or 16%), and in infrastructure (192 million euros, or 12%). Therefore, the impact of the floods was greatest in the areas of production and access to social services, as compared to the destruction of various forms of infrastructure. Regarding individual sectors of economic and social activity, the most affected sectors were mining and energy (494 million euros, or 32% of total damages and losses), followed by housing (231 million euros, or 15%), agriculture (228 million euros, or 15%), trade (225 million euros, or 15%), and transportation (167 million euros, or 11%).²⁴

A total of 3,299 claims for compensation were submitted, amounting to 38.8 million euros, mostly related to property insurance for fire and other hazards, other property insurances, and auto casco insurance. The increase in reported damages during the 2014 floods also led to a negative relationship between premiums and reported damages, which, in turn, impacted business results, as the total premium for flood risk insurance amounted to 5.4 million euros.²⁵

For comparison, according to the NBS report on settled claims, by the end of Q4 2014, a total of 27,707,550,000 RSD was paid out in insurance claims. Of this, in the same year, for property insurance against fire and other hazards (0801 – fire and other hazards insurance outside of industry and crafts, and 0802 – fire and other hazards insurance in industry and crafts), a total of 1,891,296,000 RSD was paid out. From a percentage perspective, the share of claims paid under lines 0801 and 0802 in the total amount reaches 6.82%, of which 38.8 million euros was paid for damages caused by the 2014 floods.

Given the immense damage, which was minimally covered by insurance, the government took certain actions to reduce the detrimental effects. The Republic of Serbia requested and accepted assistance from international organizations, such as the European Union and other countries, in the form of financial aid, equipment, and expert personnel for emergency interventions.

After the floods, the Republic of Serbia provided financial assistance and subsidies for the reconstruction of damaged households, infrastructure, and industrial facilities.

One of the proposals for improving natural disaster risk management is the development of specialized types of tools, modeled after leading reinsurance companies such as *NATHAN* and *NatCat*. These types of tools enable the simulation of potential damages caused by natural disasters, which contributes to more accurate risk assumption, the improvement of services provided by insurers to policyholders, as well as more efficient decision-making within insurance companies.

²⁴ UN Serbia, World Bank Group, EU, „Floods in Serbia 2014“, 2014, available at: <https://www.obnova.gov.rs/uploads/useruploads/Documents/Izvestaj-o-proceni-potreba-za-oporavak-i-obnovu-posledica-poplava.pdf>, 10.8.2024, 4.

²⁵ Milan B. Cerović, „Rezultati osiguranja u Republici Srbiji u 2014. godini“, *Tokovi osiguranja*, No. 3/2015, 24.

The development of parametric insurance is also essential, as it would contribute to reducing insurers' costs and the time required to assess damages when a loss event occurs. If we consider a hypothetical scenario where the policyholder has insured their property against flood risk based on a predefined parameter – the river level, and the predefined damaging event occurs with the river level exceeding 3 meters, the previously agreed insurance payout would be made. Thus, parametric insurance is not correlated with actual damages but is based on predefined parameters (index-based) related to specific events.

V Conclusion

Natural disasters present a complex challenge for both society and the insurance market. The consequences left by natural disasters require efficient risk management strategies and innovations in the insurance sector. Parametric insurance stands out as an important tool in providing faster and more efficient responses to catastrophic events, while innovative technologies such as *NATHAN* and *NatCat* are crucial for improving risk assessment and disaster management.

Given the increasing frequency and intensity of natural disasters, continuous education, the improvement of legal frameworks, and international cooperation are essential for reducing harmful consequences and improving community resilience. The development and implementation of innovative solutions in the insurance sector can significantly contribute to mitigating the negative effects of natural disasters. Research and innovations should be continuously developed to ensure the sustainability of the insurance market in light of climate change and growing natural disaster risks. The promotion of parametric insurance should also be considered, aiming for faster claims payouts, as well as international collaboration and the application of modern technologies for risk assessment.

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